

78-872

No.

Supreme Court, U. S.

FILED

NOV 30 1978

MICHAEL RODAK, JR., CLERK

IN THE
Supreme Court of the United States
OCTOBER TERM, 1978

ATCHISON, TOPEKA & SANTA FE RAILWAY Co., *et al.*,
Petitioners,

v.

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES, INC.,
et al.,
Respondents.

On Petition for Writ of Certiorari to the United States
Court of Appeals for the District of Columbia Circuit

APPENDIX

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TABLE OF CONTENTS

	Page
APPENDIX A—List of Railroad Petitioners	1a
APPENDIX B—Opinion of the United States Court of Appeals for the District of Columbia Circuit in Nos. 77-1187, 77-1193, and 77-1292, August 2, 1978, and Orders of August 7, August 25, and September 6, 1978, correcting the opinion	1b
APPENDIX C—Order of the Court of Appeals, October 16, 1978, modifying the August 2, 1978, opinion ..	1c
APPENDIX D—Decision of the Interstate Commerce Commission in <i>Ex Parte No. 319, Investigation of Freight Rates for the Transportation of Recyclable or Recycled Commodities</i> , 356 I.C.C. 113, February 4, 1977	1d
APPENDIX E—Judgment of the Court of Appeals for the District of Columbia Circuit in Nos. 77-1187, 77-1193, and 77-1292, August 2, 1978	1e
APPENDIX F—Statute Involved: Section 204 of the Railroad Revitalization and Regulatory Reform Act of 1976, 90 Stat. 31	1f
APPENDIX G—Interstate Commerce Commission's <i>Executive Summary of the Final Environmental Impact Statement in Ex Parte No. 319</i> , January 4, 1977 ..	1g

APPENDIX A

APPENDIX A**WESTERN RAILROADS**

The Atchison, Topeka and Santa Fe Railway Company
Burlington Northern Inc.
Chicago and North Western Transportation Company
Chicago, Milwaukee, St. Paul and Pacific Railroad Company
Chicago, Rock Island and Pacific Railroad Company (William M. Gibbons, Trustee)
The Denver and Rio Grande Western Railroad Company
Elgin, Joliet and Eastern Railway Company
Green Bay and Western Railroad Company
Illinois Central Gulf Railroad Company
Illinois Terminal Railroad Company
The Kansas City Southern Railway Company
Missouri-Kansas-Texas Railroad Company
Missouri Pacific Railroad Company
St. Louis-San Francisco Railway Company
St. Louis Southwestern Railway Company
Soo Line Railroad Company
Southern Pacific Transportation Company
Toledo, Peoria & Western Railroad Company
Union Pacific Railroad Company
The Western Pacific Railroad Company

EASTERN RAILROADS

The Akron, Canton & Youngstown Railroad Company
The Baltimore and Ohio Railroad Company
Bangor and Aroostook Railroad Company
Boston and Maine Corporation
Canadian National Railway Company d/b/a Grand Trunk Railway System (Lines in New England)
Canadian Pacific Railway Company
Central Vermont Railway, Inc.
The Chesapeake And Ohio Railway Company
Chicago & Eastern Illinois Railroad Company
Chicago South Shore and South Bend Railroad
Consolidated Rail Corporation
Delaware and Hudson Railway Company
The Detroit and Toledo Shore Line Railroad Company
Detroit, Toledo and Ironton Railroad Company

Elgin, Joliet and Eastern Railway Company
Grand Trunk Western Railroad Company
Illinois Terminal Railroad Company
Long Island Railroad Company
Maine Central Railroad Company
Norfolk and Western Railway Company
The Pittsburgh and Lake Erie Railroad Company
Richmond, Fredericksburg and Potomac Railroad Company
St. Johnsbury & Lamoille County Railroad
Toledo, Peoria & Western Railroad Company
Western Maryland Railway Company

SOUTHERN RAILROADS

Carolina, Clinchfield and Ohio Railway
Central of Georgia Railroad Company
The Cincinnati, New Orleans and Texas Pacific Railway
Company
Florida East Coast Railway Company
The Georgia Railroad
Louisiana & Arkansas Railway Company
Louisville and Nashville Railroad Company
Norfolk Southern Railway Company
Seaboard Coast Line Railroad Company
Southern Railway Company

APPENDIX B

APPENDIX B

Notice: This opinion is subject to formal revision before publication in the Federal Reporter or U.S. App. D.C. Reports. Users are requested to notify the Clerk of any formal errors in order that corrections may be made before the bound volumes go to press.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 77-1187

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES, INC.,
PETITIONER

v.

INTERSTATE COMMERCE COMMISSION AND
UNITED STATES OF AMERICA, RESPONDENTS

ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY,
et al., AMERICAN PAPER INSTITUTE, INC., ALUMINUM
ASSOCIATION, INC., FORT HOWARD PAPER COMPANY,
EASTERN RAILROADS, AND BERGSTROM PAPER COMPANY,
et al., INTERVENORS

No. 77-1193

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES, INC.,
PETITIONER

v.

INTERSTATE COMMERCE COMMISSION AND
UNITED STATES OF AMERICA, RESPONDENTS

ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY,
et al., AND EASTERN RAILROADS, INTERVENORS

Bills of costs must be filed within 14 days after entry of judgment. The court looks with disfavor upon motions to file bills of costs out of time.

No. 77-1292

INSTITUTE OF SCRAP IRON AND STEEL, INC., PETITIONER

v.

INTERSTATE COMMERCE COMMISSION AND
UNITED STATES OF AMERICA, RESPONDENTSNORTHWESTERN STEEL & WIRE COMPANY, EASTERN RAIL-
ROADS, ATCHISON, TOPEKA & SANTA FE RAILWAY
COMPANY, *et al.*, AND ARMCO STEEL CORPORATION,
INTERVENORSPetitions for Review of Orders of the
Interstate Commerce Commission

SYLLABUS

The Interstate Commerce Commission instituted an investigation into the lawfulness of the rate structures on recyclable and virgin resource materials pursuant to Section 204 of the Railroad Revitalization and Regulatory Reform Act of 1976. After an investigation, the Commission, with three Commissioners dissenting, concluded that the majority of the rates were lawful and declined to order their removal. Petitioners filed petitions to review the Commission's order, claiming that the Commission did not comply with the mandate of Section 204 by, among other things, relieving the railroads of their statutory burden of proof and declining to order removal of unlawful rates on competing recyclable materials. The United States, as statutory respondent, joined in petitioners' challenge to the Commission's order. In a consolidated petition, petitioner also challenged a Commission order terminating two general revenue proceedings conducted during the pendency of the Com-

mission's investigation on the ground that the Commission did not comply with the requirements of the National Environmental Policy Act of 1969. *Held*: The order of the Commission in its investigation is vacated, and the case remanded for further proceedings consistent with this opinion; the consolidated petition to review is dismissed as untimely filed. Pp. 4-41.

1. In view of the provisions of Section 204, its legislative history, and the background of congressional concern surrounding its enactment, the Commission's mandate was to investigate rates for recyclable or recycled materials and competing virgin natural resource materials, and to require removal from rate structures of unreasonableness or unjust discrimination; and the Commission was not permitted to assume or defer to asserted revenue needs or to give them greater weight than environmental and energy goals, but was to uphold disparate rate structures only where actually warranted after consideration of all of the transportation characteristics, including the competitive relationships and costs, of the materials involved. Pp. 17-25.

2. On this record, the Commission's order does not represent a reasoned compliance with the mandate of Section 204. Pp. 25-41.

(a) The Commission did not address or require proof on the focal question whether the substantial rate disparities between recyclable and virgin products are justified by differences in transportation characteristics. Pp. 25-26.

(b) Several of the Commission's underlying findings and conclusions with respect to the reasonableness and unjust discrimination issues were inconsistent with its mandate and inadequately supported. Pp. 26-40.

3. The consolidated petition to review, filed in advance of the jurisdictional time limit, must be dismissed as premature. P. 41.

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United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 77-1187

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES, INC.,
PETITIONER

v.

INTERSTATE COMMERCE COMMISSION AND
UNITED STATES OF AMERICA, RESPONDENTS

ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY,
et al., AMERICAN PAPER INSTITUTE, INC., ALUMINUM
ASSOCIATION, INC., FORT HOWARD PAPER COMPANY,
EASTERN RAILROADS, AND BERGSTROM PAPER COMPANY,
et al., INTERVENORS

No. 77-1193

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES, INC.,
PETITIONER

v.

INTERSTATE COMMERCE COMMISSION AND
UNITED STATES OF AMERICA, RESPONDENTS

ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY,
et al., AND EASTERN RAILROADS, INTERVENORS

Bills of costs must be filed within 14 days after entry of judgment. The court looks with disfavor upon motions to file bills of costs out of time.

No. 77-1292

INSTITUTE OF SCRAP IRON AND STEEL, INC., PETITIONER

v.

INTERSTATE COMMERCE COMMISSION AND
UNITED STATES OF AMERICA, RESPONDENTSNORTHWESTERN STEEL & WIRE COMPANY, EASTERN RAIL-
ROADS, ATCHISON, TOPEKA & SANTA FE RAILWAY
COMPANY, *et al.*, AND ARMCO STEEL CORPORATION,
INTERVENORSPetitions for Review of Orders of the
Interstate Commerce Commission

Argued March 16, 1978

Decided August 2, 1978

Edward L. Merrigan for petitioner in Nos. 77-1187 and 77-1193 and on the reply brief for intervenor Bergstrom Paper Company *et al.* in No. 77-1187.

David Reichert, with whom *Howard Gould* and *Stephen D. Strauss* were on the brief, for petitioner in No. 77-1292.

Kenneth G. Caplan, Attorney, Interstate Commerce Commission, with whom *Robert S. Burk*, Deputy General Counsel, and *Charles H. White, Jr.* and *Frederick W. Read, III*, Associate General Counsel, Interstate Commerce Commission, were on the brief, for respondent Interstate Commerce Commission. *Mark L. Evans*, General Counsel, and *Peter A. Fitzpatrick*, Attorney, Inter-

state Commerce Commission, also entered appearances for respondent Interstate Commerce Commission.

James F. Ponsoldt, Attorney, Department of Justice, with whom *Barry Grossman*, Attorney, Department of Justice, was on the brief, for respondent United States of America. *Lloyd John Osborn* and *Carl D. Lawson*, Attorneys, Department of Justice, also entered appearances for respondent United States of America.

Michael Boudin, with whom *Charles N. Marshall* and *Stuart C. Stack* were on the brief, for intervenor Southern and Western Railroads.

John F. Donelan, with whom *John K. Maser, III* and *Renee D. Rysdahl* were on the brief, for intervenors American Paper Institute, Armco Steel Corporation, Inland Steel Corporation, Republic Steel Corporation, and Youngstown Sheet & Tube Company.

John A. Daily, with whom *Richard W. Kienle* was on the brief, for intervenor Eastern Railroads.

Dickson R. Loos was on the brief for intervenor Aluminum Association Inc.

William L. Strauss was on the brief for intervenor Fort Howard Paper Company.

Warren Price, Jr. was on the brief for intervenor Northwestern Steel & Wire Company.

Before WRIGHT, *Chief Judge*, and SWYGERT * and LEVENTHAL, *Circuit Judges*.

Opinion for the court filed by *Chief Judge* WRIGHT.

* Of the Seventh Circuit, sitting by designation pursuant to 28 U.S.C. § 291(a) (1970).

WRIGHT, *Chief Judge*: In these consolidated cases¹ we are called upon to review a final report and order of the Interstate Commerce Commission declining to remove alleged unlawful rates from the freight rate structures for recyclable and virgin resource materials transported by the nation's railroads. The order under re-

¹ We originally consolidated four separate cases, *National Ass'n of Recycling Industries, Inc. v. ICC*, No. 77-1187; *Institute for Scrap Iron & Steel v. ICC*, No. 77-1292; *National Ass'n of Recycling Industries, Inc. v. ICC*, No. 77-1193; and *Durbin Paper Stock Co. v. ICC*, No. 77-1328, the first two of which are consolidated petitions challenging the report and order here under review. In No. 77-1193 the petition seeks review of a final order of the Commission terminating two general revenue proceedings, *Ex Parte No. 318, Increased Freight Rates and Charges, 1976*, and *Ex Parte No. 336, Increased Freight Rates and Charges, 1977*, in which the Commission approved rate increases applicable to recyclable materials, in one instance without preparing a threshold assessment survey, as required by the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321-4335 (1970), until six months after its approval of the increase, and in the other instance without preparing any environmental statement whatever. Although it raises serious legal questions under NEPA, see *Asphalt Roofing Manufacturers Ass'n v. ICC*, 567 F.2d 994, 1004-1006 (D.C. Cir. 1977), we have concluded that the petition, filed in advance of the 60-day jurisdictional time limit provided by the Hobbs Act, 28 U.S.C. § 2344 (1970), must be dismissed as premature. See *Industrial Union Department, AFL-CIO v. Bingham*, 570 F.2d 965, 968-969 (D.C. Cir. 1977). We add, however, that the Commission will be required to reconsider the lawfulness and cumulative environmental impact of the rate increases challenged by this petition because of our disposition herein, in Nos. 77-1187 and 77-1292, vacating and remanding the Commission's order. Similarly, the Commission will be required upon remand to reconsider issues presented by the remaining petition in No. 77-1328, which we have decided by separate opinion filed this day. See *Durbin Paper Stock Co. v. ICC*, — F.2d — (D.C. Cir. No. 77-1328, decided 1978).

view,² dissented from by three commissioners³ and challenged here by both representatives of recycling industries⁴ and the United States,⁵ reflects the agency's efforts to comply with Section 204 of the Railroad Revitalization and Regulatory Reform Act of 1976.⁶ This provision directed the Commission to conduct an expedited investigation into the lawfulness of the rate structures and to order removal of all rates not shown by the railroads to be just, reasonable, and nondiscriminatory.⁷ We find that the challenged order does not represent a reasoned compliance with the mandate expressed by Congress in Section 204. We therefore vacate the order and remand for further proceedings.

² The order was entered in the Commission's proceeding entitled *Ex Parte No. 319, Investigation of Freight Rates for the Transportation of Recyclable or Recycled Materials*. Incorporated in this order is the published report and order of the Coordinator in *Ex Parte No. 270 (Sub No. 6), Investigation of Railroad Freight Rate Structure—Scrap Iron and Steel*, 345 ICC 867 (1976).

³ See pp. 16 & 17 & note 44 *infra*.

⁴ Petitioners here, the National Association of Recycling Industries (NARI) and the Institute for Scrap Iron and Steel (ISIS), are national trade association representatives of the recycling industries. NARI challenges that part of the Commission's order related to the rate structures on recyclable nonferrous metal, wastepaper, textiles, and rubber. ISIS challenges the Commission's determinations with respect to the rate structures on scrap iron and steel.

⁵ As a statutory respondent, 28 U.S.C. §§ 2322, 2342 (1970), the United States, on behalf of the Environmental Protection Agency and the Federal Energy Administration, challenges the Commission's order in its entirety.

⁶ Pub. L. No. 94-210, § 204, 90 STAT. 40 (1976). The statute is hereinafter referred to as the Regulatory Reform Act.

⁷ Section 204 is set forth in Appendix A of this opinion.

I

The significance and purpose of the investigation required by Section 204 cannot be understood apart from the Commission's past experience with ratemaking on recyclable materials. That experience occurred largely in the context of general revenue proceedings, in which the Commission's main task involved determination of the appropriate revenue levels and needs of the railroads, rather than the lawfulness of the rates on these materials. It is to the controversial history⁸ of those proceedings that we turn first in placing the investigation under review, and the Commission's approach and findings therein, in proper perspective.

Under the Interstate Commerce Act⁹ the initiative for ratemaking is vested in the railroads, subject to approval by the Commission in an appropriate proceeding. One method by which the railroads may initiate a rate increase is by filing a group tariff in which all or substantially all of the nation's railroads propose an across-the-board percentage increase in rates. In these so-called general revenue proceedings the Commission may either find the proposed increase just and reasonable after taking evidence relating to the general need for increased revenues,¹⁰ or "approve" the increase by declining to declare it unlawful following an investigation.¹¹ The

⁸ See note 19 *infra*.

⁹ 49 U.S.C. § 1 *et seq.*

¹⁰ See *New England Divisions Case*, 261 U.S. 184, 196-199, 201-203 (1923).

¹¹ See *United States v. Louisiana*, 290 U.S. 70, 73-79 (1933). See also *Aberdeen & Rockfish R. Co. v. SCRAP (SCRAP II)*, 422 U.S. 289, 311-316 (1975). In an investigation the railroads have the burden of proving that an increase is just and reasonable, 49 U.S.C. § 15(7) (1970); 49 U.S.C.A. § 15(8) (f) (1977 Pocket Part).

characteristic feature of these proceedings is that the Commission focuses only on the need of the carriers for increased revenues, not on whether any particular application of the increase is just, reasonable, or nondiscriminatory. Nevertheless, the effect of Commission approval of a general increase is to shift the burden of proof from the carriers favoring the increase to complainants later challenging it.¹² Once the general increase has been approved, particular applications of the increase may then be challenged in subsequent proceedings under the Act.¹³

Pursuant to this scheme the Commission approved, over the past decade, a series of annual upward adjustments in rates applicable to recyclable materials.¹⁴ Ap-

¹² Commenting on this burden-shifting procedure, we have observed that it is "justified by the need for quick action and the assumption that once a general need has been demonstrated most individual increases will be found just and reasonable." *Council of Forest Industries of British Columbia v. ICC*, 570 F.2d 1056, 1060 (D.C. Cir. 1978).

¹³ Complainants who wish to challenge an application of the rate increase may file a complaint with the Commission under § 13(1), 49 U.S.C. § 13(1) (1970), but in any Commission investigation of the complaint under § 15(1), 49 U.S.C. § 15(1) (1970), complainants bear the burden of proving that the rate is unlawful. See *Atchison, Topeka & Santa Fe R. Co. v. Wichita Board of Trade*, 412 U.S. 800, 812-813 (1973). Procedures following a similar outline govern rate filings by individual carriers, the other method by which railroads may initiate increases in rates.

¹⁴ The Commission approved rate increases on recyclables by declining to declare them unlawful in the following proceedings: *Ex Parte* No. 256, *Increased Freight Rates and Charges, 1967*, 329 ICC 854 (1968); *Ex Parte* No. 259, *Increased Freight Rates and Charges, 1969*, 337 ICC 436 (1970); *Ex Parte* No. 262, *Increased Freight Rates and Charges, 1969*, unpublished; *Ex Parte* No. 265, *Increased Freight Rates and Charges, 1970*, 339 ICC 125 (1971); *Ex*

[continued]

pearing in proceedings to oppose the proposed increases, shippers and representatives of recycling industries contended that the proposed rates and underlying rate structures on recyclable products were unreasonably high and discriminatory when compared with the lower rates and rate structures traditionally prevailing on virgin resource materials. They also maintained that application of the proposed increases to recyclables would adversely affect the environment by discouraging industrial use of recycled products, thereby contributing to depletion of the nation's virgin resources. In the limited context afforded by general revenue proceedings, and subject to the aforementioned rules governing complainants' burden of proof, the Commission invariably concluded that complainants had neither met their burden of refuting the railroads' submission of needed revenues, nor otherwise demonstrated that demand for recyclables would be unlawfully reduced as a result of the proposed in-

Parte No. 267, Increased Freight Rates and Charges, 1971, 339 ICC 125 (1971); Ex Parte No. 281, Increased Freight Rates and Charges, 1972, 341 ICC 290 (1973); Ex Parte No. 295 (Sub-No. 1), Increased Freight Rates and Charges, 1973, 344 ICC 589 (1973); Ex Parte No. 303, Increased Freight Rates and Charges, 1974, unpublished; Ex Parte No. 305, RE, Nationwide Increase of Ten Percent in Freight Rates and Charges, 1974, unpublished; Ex Parte No. 313, Increased Freight Rates and Charges—Labor Costs, 1975, unpublished; Ex Parte No. 318, Increased Freight Rates and Charges, 1976, unpublished; Ex Parte No. 336, Increased Freight Rates and Charges, 1977, unpublished. Together these proceedings yielded rate increases applicable to recyclable materials totalling approximately 70%. In addition to any economic and environmental impacts associated with the rate structures, it may be observed that percentage rate increases themselves, although facially neutral, may have independent impacts, since a rate increases a high rate by a larger absolute amount than it does a low rate.

crease.¹⁵ Numerous environmental impact statements and threshold assessment surveys were also prepared,¹⁶ concluding that increases in freight rates would have

¹⁵ *Id.* A review of these proceedings reveals findings by the Commission that rate increases on recyclables are reasonable in part because recyclable products are subject to relative demand inelasticities to freight rate increases. In economic theory, price and product demand elasticities serve to measure buyer response to increased product prices and shipper response to percentage changes in price. The Commission found in these proceedings that increases in transportation prices did not cause significant shifts in demand for recyclable products. For a discussion of the significance of demand elasticity findings, and the elasticity studies relied upon by the Commission in this proceeding, see pp. 28, 30-31, & notes 80-83 *infra*.

¹⁶ See, e.g., *Ex Parte No. 281, Increased Freight Rates and Charges, 1972, 346 ICC 88 (1973)*. The Commission's response to its responsibilities under NEPA has aptly been characterized as "slow," *City of New York v. United States*, 333 F.Supp. 150, 158-160 (E.D. N.Y. 1972), or "tardy," *SCRAP II*, *supra* note 11, 422 U.S. at 324. Although it is established that a general revenue proceeding is itself "a 'major federal action' * * * requiring its own final environmental impact statement so long as the proceeding has a substantial effect on the environment," *SCRAP II*, *supra* note 11, 422 U.S. at 318-319, there are indications that the Commission may be continuing to neglect its NEPA responsibilities, both by declining to prepare any environmental statements in support of rate increases applicable to recyclables, see *Ex Parte No. 336, Increased Freight Rates and Charges, 1977, supra* note 14, and by preparing plainly inadequate ones, *Asphalt Roofing Manufacturers Ass'n v. ICC*, *supra* note 1. The Commission, we note, has on occasion indicated views contrary to those set forth in its environmental impact statements. In *Ex Parte No. 310, Increased Freight Rates and Charges, 1975, 349 ICC 555, 578 (1975)*, for example, the Commission stated:

[I]t remains a basic economic fact that not granting a proposed rate increase for recyclables will generate a degree of positive environmental benefit. This course of

[continued]

either no effect or a negligible one on industrial use of recycled products.

Throughout this period the Commission steadfastly refused to conduct a broad investigation into the lawfulness of the underlying rate structures on recyclable products. Apparently of the view that such an investigation was unnecessary in light of the findings reached in its general revenue proceedings, the Commission repeatedly declined requests by representatives of the recycling industry to undertake such an investigation,¹⁷ and, indeed, vigorously opposed legislation under consideration by Congress that would have required nothing less.¹⁸ Prodded

action would in the first instance preclude any reduction in the movement of recyclables which may otherwise have been evidenced as a direct response to the increase. Secondly, as [rates on] virgin counterparts are allowed to increase incrementally, recyclables will be placed in a more favorable economic posture. * * * Transportation rates for recyclable materials thus play a part * * * in wide-ranging, multifaceted relationships which inhibit optimal levels of resource conservation and produce or allow concomitant adverse environmental ramifications. To the extent that recyclable rate increases are subjected to holddowns or eliminated entirely, the action would be consistent with established national policies and would provide for a measure of environmental improvement.

¹⁷ See, e.g., *Ex Parte* No. 281, 346 ICC 88 (1973). See also *Ex Parte* No. 306, *Implementation of Public Law 93-236, Freight Rates for Recyclables*, 346 ICC 408, 411 (1974).

¹⁸ Commissioner Stafford, former Chairman of the Commission, testified before congressional committees on two occasions to oppose legislation similar to § 204. Based on this testimony, petitioner NARI sought the Chairman's recusal from this proceeding. We do not decide whether the Chairman's refusal to recuse himself was erroneous under the circumstances of this case, see *Pillsbury Co. v. FTC*, 354 F.2d 952 (5th Cir. 1966), although we note that the views expressed appear to have foreshadowed the Commission's approach to this investigation.

by increasing litigation,¹⁹ however, the Commission, on December 12, 1973, finally instituted an investigation²⁰ into the lawfulness of the rate structures for movements of scrap iron and steel, one of the recyclable materials herein involved. The Commission's final report, issued on February 4, 1976, confirmed generally its previous findings with respect to scrap iron and steel.²¹ Citing the

¹⁹ This protracted litigation, challenging the Commission's approval of a general rate increase in *Ex Parte* No. 281, produced three opinions by a three-judge District Court, *SCRAP v. United States*, 371 F.Supp. 1291 (D. D.C. 1974); 353 F.Supp. 317 (D. D.C. 1973); 346 F.Supp. 189 (D. D.C. 1972); and two by the Supreme Court, *United States v. SCRAP*, 412 U.S. 669 (1973); *SCRAP II*, *supra* note 11. In *SCRAP II* the Court finally upheld the environmental impact statement prepared by the Commission for that proceeding. In recognition of the nonfinal and limited nature of the issues decided by the Commission in a general revenue proceeding, the Court determined that the EIS was adequate despite its failure to consider the environmental impact of the underlying rate structures. 422 U.S. at 329.

²⁰ *Ex Parte* No. 270 (Sub-No. 5), *Investigation of Railroad Freight Rate Structure—Iron Ores*, 345 ICC 8 (1976); *Ex Parte* No. 270 (Sub-No. 6), *Investigation of Railroad Freight Rate Structure—Scrap Iron and Steel*, 345 ICC 867 (1976).

²¹ The controversy surrounding the Commission's approval of freight rates on scrap iron and steel dates as far back as 1960. The initial proceeding involved a complaint alleging that the rate structures violated § 3(1) of the Interstate Commerce Act, 49 U.S.C. § 3(1) (1970), *quoted at note 79 infra*. The Commission dismissed the complaint, ruling that scrap iron and iron ore do not compete. *Institute of Scrap Iron and Steel, Inc. v. Akron, C. & Y. R. Co.*, 316 ICC 55 (1962). In subsequent proceedings the Commission adhered to its finding that these materials do not compete, see, e.g., *Ex Parte* No. 259, *Increased Freight Rates, 1969*, 337 ICC 436, 474 (1970); *Ex Parte* Nos. 265 and 267, *Increased Freight Rates and Charges, 1970 and 1971*, 333 ICC 125, 207 (1971); *Ex Parte* No. 281, *Increased Freight Rates and Charges, 1972*, 341 ICC 290, 413 (1972); *Ex Parte* No. 295, *Increased Freight Rates*

[continued]

relative demand inelasticity of scrap iron and steel to freight rates, and finding that the relationship between scrap iron and iron ore in the steelmaking process is complementary and not competitive,²² the report concluded that the rate structures were reasonable and non-discriminatory. The environmental impact statement prepared for this proceeding also concluded that these rate structures did not have a significant impact on the environment.²³

On February 5, 1976 Congress enacted the Regulatory Reform Act, including within it Section 204. This section, in addition to directing the Commission to investigate the rail rate structures for "recyclable materials" and for "competing virgin natural resource materials," as defined therein,²⁴ expressly reversed, for the purpose of the investigation, the rules normally governing complainants' burden of proof. It directed the Commission to determine, after a "public hearing during which the burden of proof shall be on" the railroads, whether the "rate structures as affected by rate increases applicable to the transportation of such competing materials is just, reasonable, and nondiscriminatory."²⁵ Section 204 further instructed the Commission to order removal of all unreasonableness or unjust discrimination from such rate structures.²⁶ The remaining provisions of the statute re-

and Charges, 1973, 349 ICC 250, 279 (1974). On one occasion the Commission did find that competition was shown on the record, and it therefore limited increases in scrap iron rates to those imposed on iron ore. *Ex Parte No. 256, Increased Freight Rates, 1967, 332 ICC 280, 331 (1968).*

²² 345 ICC 867, 1199-1200 (1976).

²³ The environmental impact statement concluded that changes in transportation rates would have negligible short- and long-term impacts on demand for recycled scrap.

²⁴ Section 204(e) of the Act, *quoted in* Appendix A.

²⁵ Section 204(a) (2) of the Act, *quoted in* Appendix A.

²⁶ Section 204(a) (3) of the Act, *quoted in* Appendix A.

quire the Commission to comply fully with the requirements of NEPA,²⁷ and directed the Environmental Protection Agency²⁸ and the Department of Transportation²⁹ to participate and assist the Commission in carrying out the required investigation.

Responding to this mandate, the Commission instituted the proceeding under review on February 25, 1976. By order it designated recyclable and virgin resource materials for inclusion within its investigation and instructed the railroads, in accordance with the burden of proof imposed upon them by Section 204, to submit evidence with respect to the costs and revenues derived from their movements of the listed materials.³⁰ It also, by order, incorporated into the record the findings and conclusions of its previous investigation in *Ex Parte No. 270*.³¹ After public hearings and submission of verified

²⁷ Section 204(d) of the Act, *quoted in* Appendix A.

²⁸ Section 204(b) of the Act, *quoted in* Appendix A.

²⁹ Section 204(c) of the Act, *quoted in* Appendix A.

³⁰ II Joint Appendix (JA 341). The Commission required the parties to submit evidence on seven topics: (1) historical evidence of costs and movement of recyclable and virgin materials; (2) historical evidence on utilization of recyclable materials; (3) sensitivity of recyclable materials to changes in transportation rates; (4) effect of rate changes on individual railroads; (5) effect of rate changes on service to shippers of recyclable commodities; (6) alternative rate structures; and (7) other pertinent evidence not considered elsewhere. *Id.*

³¹ II JA 366. Petitioners and the United States point to the Commission's decision to incorporate the Coordinator's report in *Ex Parte No. 270* as an indication that the Commission relieved the railroads of their burden of proving the lawfulness of the rate structures. On the circumstances disclosed by the record, we agree. *Ex Parte No. 270* was a nonadversary proceeding which, as the Commission acknowledged, was significantly different from the proceeding under review because

[continued]

statements from interested parties, the Commission issued its final report and order, accompanied by draft and final environmental impact statements, on February 1, 1977.

The evidence submitted by the railroads was repeatedly criticized by the federal agencies participating in the investigation,³² and by the Commission itself in its final report.³³ It did indicate, however, that the rates for

of the requirement of § 204 that the railroads maintain the burden of proof. Order at 76. Having acknowledged the differences between these proceedings, however, the Commission proceeded to treat the Coordinator's conclusions as creating a presumption that the rate structures were lawful. *See id.* at 75-80. While we believe it was appropriate for the Commission to consider the evidence developed in *Ex Parte* No. 270, it was clearly inappropriate for the Commission to accord presumptive weight to the findings of the Coordinator's report. That report was issued prior to the enactment of § 204, and was therefore superseded by it. Moreover, any approach which treated rate structures as presumptively lawful was inconsistent with the mandate of § 204.

³² In its reply to the railroads' submissions EPA criticized the railroads' evidence and contended that the railroads had not met their burden of proof. III JA 1299-1318. Among the deficiencies noted EPA found that the railroads "submitted only traffic and revenue data, ignoring the requirement that costs be shown for each of the representative moves"; "failed to respond" with any evidence on five of the seven categories to which the Commission directed their attention; and presented aggregate cost studies which "fail[ed] to reflect the peculiar transportation characteristics of the study commodities." III JA 1303-1306.

³³ *See, e.g.*, Order at 31, 33. In particular, the Commission found that there was no evidence on the effect of the rate structures on intermodal competition, *id.* at 49, 100, and that "all respondents failed to show comparisons of results for recyclable commodities with their competing or potentially competitive virgin commodities," *id.* at 31. In some instances, where evidence was submitted, the Commission declined to evaluate it. For example, the Commission declined to make a detailed analysis of the cost evidence presented. *Id.* at 36.

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movements of the listed recyclable materials were significantly higher than those for their virgin resource material counterparts.³⁴ In many instances the railroads' evidence revealed that the rates on recyclables were in excess of the national average,³⁵ while corresponding rates on virgin materials were below compensatory levels.³⁶ Nevertheless, the Commission refused to conclude that the rate structures were unlawful based solely on the evidence of wide rate disparities. Instead, it determined that it would apply traditional ratemaking

Finally, confronted with deficiencies in the railroads' evidence, the Commission repeatedly admonished the shippers for their failure to adduce evidence to support their contentions. *Id.* at 18, 19, 131, 133.

³⁴ The Commission computed ratios of revenues to variable costs and revenues to fully allocated costs for relevant movements. Comparison of those ratios demonstrated that the rates for recycled products were uniformly higher than the rates on virgin products. *See, e.g.*, Order at 81, 181, 239, 288, 335y, 362, 403. For example, the Commission's comparison of the average rail transportation charge of iron ore with that of scrap revealed that the average rail rate of scrap was approximately twice that of iron ore, in dollars per ton. *Id.* at 136. Similarly, its comparison of the relative rates for scrap versus commodities for paper, aluminum, copper, zinc, and lead indicated that the rates for paper and aluminum scrap were more than one and a half times the rates for comparable virgin products, and that the rates for lead scrap were three times the rates for virgin lead. *Id.* at 45. *See also id.* at 196 (aluminum rates), 295 (zinc rates), 296 (lead rates).

³⁵ The majority of the revenue-cost ratios computed by the Commission for recycled products exceeded the national average ratio of 131.8 for products moving by rail. *See, e.g.*, Order at 70, 81, 239, 288, 335y, 362, 403.

³⁶ The record indicated, for example, that eastern and southern railroads carry virgin pulpwood and wood chips at rates substantially below their variable costs, III JA at 995-1000, 1007, 1008, 1009-1020, at the same time that recycled waste-paper and textile wastes were transported at rates significantly in excess of such costs. I JA at 326, 337.

criteria to determine the lawfulness of the rate structures on a product-by-product basis.³⁷ Applying such criteria, it concluded that the rate structures on practically all of the recyclable materials were reasonable and that none of the rate structures were discriminatory. The articulated bases for these determinations varied slightly according to the product involved. Referring to the relative demand inelasticities of recyclable materials to freight rates, as shown by freight commodity statistics submitted by the railroads³⁸ and demand elasticity studies³⁹ employed in the environmental impact statement, the Commission found that the recent rate increases did not result in a decreased volume in the amount of recyclable traffic moved by the railroads. The Commission further found that several of the recyclable materials did not in fact compete with their virgin material counterparts for transportation purposes, and that shippers of recyclables were not competitively injured by current rate disparities. Based on these findings, supported by the conclusions of the accompanying environmental impact statement,⁴⁰ the Commission issued the final order

³⁷ Order at 70.

³⁸ The freight commodity statistics measured the volume of recyclable traffic carried by the railroads over several years and showed in most instances that the volume of recyclable traffic did not decrease during years of rate increases.

³⁹ The Commission relied to a great extent on the so-called Gellman elasticity study, submitted by the railroads, as well as on the results of elasticity studies analyzed in the environmental impact statement. Those studies revealed that demand for recyclable products had been inelastic to rate increases in recent years. See text and note at note 75 *infra*.

⁴⁰ The environmental impact statement, analyzing the economic and environmental impacts of freight rates on each recycled product, concluded that freight rates have not had a significant effect on the use of recycled products, and therefore that the Commission's action has no significant impact on the quality of the environment. Order at 66-67.

here under review, declining, with few exceptions,⁴¹ to order any reductions in the applicable rates.

Three Commissioners dissented from the majority's report, arguing that the Commission did not comply with its mandate under Section 204.⁴² According to the dissenting Commissioners, the majority unlawfully relieved the railroads of their burden of proof under Section 204 by failing to require the railroads to justify the rate structures based on the transportation characteristics of the products involved. Advancing similar as well as other related challenges to the Commission's order,⁴³ petitioners thereupon filed these petitions for review, in which the United States has joined in urging that the order be set aside.

II

Much of the controversy throughout this proceeding has centered on the appropriate interpretation to be given to the Commission's mandate under Section 204. We do not believe the interpretative issue is nearly as difficult as the array of conflicting and exceedingly elaborate positions presented by the parties would suggest.⁴⁴

⁴¹ In a few instances the Commission found that the rates for recyclable products were unreasonably high and accordingly ordered those rates reduced. Order at 425.

⁴² Order at 425b-d (Commissioners Christian and O'Neal, dissenting), 425e (Commissioner Clapp, dissenting).

⁴³ Petitioner NARI also appears to challenge the adequacy of the environmental impact statement prepared by the Commission. We do not address this issue, since we find that the challenged order is not reasonably consistent with the mandate of § 204.

⁴⁴ Petitioners construe § 204, among other things, as a congressional declaration that recyclable and virgin commodities compete for transportation purposes. The United States disagrees with this interpretation, arguing instead that § 204 was a mandate to the Commission to weigh environmental goals

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Rather, we believe the language, and particularly the legislative history and background, of Section 204 make easily discernible the Commission's mandate in this investigation.

Section 204 was the result of several years of congressional study⁴⁵ and consideration of the problems of

more heavily than traditional transportation policy criteria. For the reasons discussed herein, we adopt neither of these views.

⁴⁵ Congress did not announce its general environmental goals and its particular emphasis on promotion of the recycling industry solely by its enactment of § 204. NEPA, in requiring all federal agencies to determine and justify the effect of any major federal action upon the nation's environment, originally directed such agencies to promote the "maximum attainable recycling of depletable resources." 42 U.S.C. § 4331 (1970). In 1970 Congress next enacted the National Materials Policy Act, Pub. L. No. 91-512, §§ 201-206, reaffirming the national policy to conserve virgin resources and enhance recycling of those materials. This Act created the National Materials Policy Commission which, after three years of investigation, submitted a final report to Congress in June 1973 recommending that the "Federal Government take the necessary steps to correct the existing freight rate differentials between secondary and primary materials." NATIONAL COM'N ON MATERIALS POLICY, FINAL REPORT TO CONGRESS 4D-18 (1973). This report followed a similar report prepared by the Environmental Protection Agency, pursuant to the Solid Waste Disposal Act, 42 U.S.C. § 3251 *et seq.* (1965), which identified inequitable freight rates as a federal disincentive to maximum recycling. ENVIRONMENTAL PROTECTION AGENCY, REPORT TO CONGRESS ON RESOURCE RECOVERY (1973). Subsequently Congress enacted the Energy Supply and Environmental Coordination Act of 1974, Pub. L. No. 93-319, requiring the Federal Energy Administration to conduct and submit to Congress a study of "alternative requirements, incentives or disincentives for increasing industrial recycling and resource recovery." Pub. L. No. 93-319, § 8(a)(2). The study ultimately prepared by the FEA concluded that the Commission's shipping rates and regulations were a regulatory restraint to industrial energy conservation. Spe-

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the recycling industry as a whole and the freight rates applied to recyclable products in particular. Informed of the limited amount of recycling occurring throughout the nation, and concerned with what it regarded as a regulatory barrier to attainment of national environmental and agency goals associated with promotion of industrial recycling,⁴⁶ Congress responded initially by including Section 603 within the Regional Rail Reorganization Act.⁴⁷ This section directed the Commission to "adopt appropriate rules" to "eliminate discrimination against the shipment of recyclable materials in rate struc-

cifically, the report found that "shipping rates that discriminate against transport of recycled materials in favor of virgin materials are a significant barrier to increased recycling." FEDERAL ENERGY ADMINISTRATION, OFFICE OF CONSERVATION AND ENVIRONMENT, REPORT TO CONGRESS: ENERGY CONSERVATION STUDY 157 (1974). Finally, in 1976 Congress enacted the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 *et seq.*; creating the National Resource Conservation Committee to ensure that barriers to recycling and energy conservation are eliminated. 42 U.S.C. § 6982(j). Such legislation, based on years of study of the problems of the recycling industry, evinces an evolving congressional plan to conserve resources and to promote recycling of depletable materials. Section 204 must therefore be viewed as an integral part of this congressional design. *See also* text and notes at notes 60-61 *infra*.

⁴⁶ Among the environmental and energy goals thought to be served by promotion of industrial recycling are: national energy savings, *see* FEDERAL ENERGY ADMINISTRATION, OFFICE OF CONSERVATION AND ENVIRONMENT, *supra* note 45; conservation of depletable natural resources, *see* NATIONAL COM'N ON MATERIALS POLICY, *supra* note 45; reduction of industrial air and water pollution and increasing water utilization, *see* ENVIRONMENTAL PROTECTION AGENCY, *supra* note 45; and disposal of solid wastes, *see* NATIONAL LEAGUE OF CITIES—U.S. CONFERENCE OF MAYORS, CITIES AND THE NATION'S DISPOSAL CRISIS (1973).

⁴⁷ Pub. L. No. 93-236, § 603 (1973).

tures and in other Commission practices where such discrimination exists." ⁴⁸ As interpreted elsewhere, Section 603 was a clear "legislative recognition of discrimination in existing rate structures and a legislative direction to the Commission to eliminate it." ⁴⁹

The Commission virtually ignored the statutory message contained in Section 603. Rather than instituting a broad investigation into the lawfulness of the rate structures, the Commission responded by promulgating redundant rules governing procedures for filing a complaint with the agency. ⁵⁰ Moreover, the Commission thereafter approved another series of general rate increases applicable to recyclables, ⁵¹ thereby possibly

⁴⁸ *Id.*

⁴⁹ *SCRAP v. United States*, 371 F.Supp. 1293, 1305-1306 (D. D.C. 1974) (three-judge court), *rev'd on other grounds*, 422 U.S. 289 (1974).

⁵⁰ See *Ex Parte* No. 306, *Public Law 93-236, Freight Rates for Recyclables*, 346 ICC 408 (1974). The Commission promulgated rules for filing complaints alleging discrimination against recyclable materials. Dissenting on the ground that these rules did not meet the intent of § 603, Commissioner O'Neal observed:

The lack of specific requirements in the statute is read by the majority * * * to indicate that the Commission need not undertake a broad investigation. But the Congress has indicated that this is an area of sufficient congressional concern to warrant a statutory message to the Commission. * * * Congress wanted the Commission to do something more than merely reaffirm that upon the filing of a formal complaint a remedy for discrimination exists at the ICC.

346 ICC at 414 (Commissioner O'Neal, dissenting).

⁵¹ The Commission approved seven successive rate increases * applicable to recyclable materials totalling approximately 38% over a two-year span. *Ex Parte* No. 295, 344 ICC 589 (1974); and subsequent proceedings cited at note 14 *supra*.

exacerbating the discrimination Congress believed was firmly imbedded in the rate structures.

The Commission's persistent refusal to investigate the rate structure, combined with its continued approval of rate increases applicable to recyclables, led representatives of the recycling industries to support a number of bills subsequently introduced in Congress. ⁵² Like Section 603, these bills all revealed Congress' dissatisfaction with the approach displayed by the Commission in its general revenue proceedings, and were aimed at eliminating rate structures which in Congress' view impeded development of increased recycling. In addition to explicitly requiring the Commission to investigate the rate structures, they would have compelled the Commission to adopt a presumption of competition between recyclable and virgin materials for the purpose of its investigation, ⁵³ and to establish recyclable rates at the lowest lawful levels compatible with maintenance of adequate transportation service. ⁵⁴ Although some of these bills were vigorously opposed by the Commission and eventually died in committee, Section 204 was finally enacted by Congress as that section emerged from the bills comprising the Regulatory Reform Act. ⁵⁵

Section 204, we believe, did not differ materially by either its terms or its underlying purpose from the bills considered and rejected by Congress. Just as those bills did not purport to change or modify substantive stand-

⁵² S. 1744, 94th Cong., 1st Sess. (1974); H.R. 12536, 93d Cong., 2d Sess. (1974). See also S. 2753, 93d Cong., 1st Sess. (1973).

⁵³ *Id.*

⁵⁴ S. 2753, *supra* note 52.

⁵⁵ The bills which evolved into the Regulatory Reform Act originated as H.R. 10979, 94th Cong., 1st Sess. (1975), and S. 2718, 94th Cong., 1st Sess. (1975).

ards relating to the lawfulness of rates,⁵⁶ neither did Section 204. Congress used familiar language, having a long-settled meaning in transportation law, in proscribing "unreasonableness" and "unjust discrimination" in rate structures. It is apparent from the use of such established terms that Congress deemed traditional transportation policy criteria adequate protection against rate structures which discouraged industrial use of recycled products.

At the same time, however, Section 204, like previous bills, was intended to ensure proper application by the Commission of established statutory standards. Thus, by reversing the rules governing complainants' burden of proof, Section 204 both precluded the Commission from adopting the approach taken in its general revenue proceedings, whereby it approved disparate rate structures based on the railroads' revenue needs, and required the railroads to justify fully the rate structures involved under established ratemaking standards.

In the order under review⁵⁷ and before this court⁵⁸ the Commission has urged that in applying traditional

⁵⁶ See *Ann Arbor R. Co. v. United States*, 281 U.S. 658, 668-669 (1930) (statute directing the Commission to investigate rate structures to determine whether rates were unreasonable or unjustly discriminatory, and to achieve the lowest possible lawful rates, did not effectuate substantive changes in existing law).

⁵⁷ While formally acknowledging the need to consider "all factors related to the transportation of commodities," Order at 70, the Commission proceeded to focus exclusively on one or two of those factors, see pp. 27-28 *infra*, and to criticize the recycling industry for failure to adduce any other evidence, see note 33 *supra*.

⁵⁸ Respondent's brief at 46 ("the burden of going forward with the evidence [shifted to the shippers] after the railroads carried their burden").

standards in this investigation it was unnecessary to require the railroads to adduce proof on all factors related to transportation of commodities, and that instead it was incumbent on the recycling industry to demonstrate by way of rebuttal those factors militating against the lawfulness of the rate structures. We believe the Commission's position reveals a serious misapprehension of the significance of the statutory reversal of the burden of proof in Section 204. As previously noted,⁵⁹ the burden-shifting procedure employed by the Commission in its general revenue proceedings is premised on the notion that once the railroads have demonstrated a need for additional revenues, most individual increases within the approved limit will be found just and lawful. The Commission approved the rate increases on recyclables subject to this procedure and its concomitant assumption in its general revenue proceedings. By reversing the burden of proof in this proceeding, however, Congress accomplished more than a mere change in the procedural format for presentation of evidence, suggested by the Commission. Specifically, it erected an evidentiary presumption against the lawfulness of the rate structures, thereby preventing the Commission from assuming, or otherwise deferring to, asserted revenue needs of the railroads in determining the lawfulness of the rates. Unlike general revenue proceedings, this investigation was to proceed from the premise that disparate rate structures were not justified by the revenue needs of the railroads, and were therefore only to be upheld where actually warranted after consideration of all of the transportation characteristics, including the competitive relationships and costs, of the materials involved.

This theme—that Congress firmly opposed disparate rates maintained by the Commission to protect the rail-

⁵⁹ See note 12 *supra*.

roads' general revenue needs without complete consideration of the transportation characteristics of these products—is clearly revealed by both of the relevant portions of the legislative history of Section 204, the Senate Commerce Committee Report⁶⁰ and the remarks made on the floor of the Senate.⁶¹ Thus in view of the provisions of Section 204, its legislative history, and the background of congressional concern surrounding its enactment, we have no doubt that the Commission's mandate in this investigation was to identify and remove disparities in the rate structures based on an in-depth examination of the transportation characteristics involved. The Commission, in the view of the proponents of Section 204, had erected barriers to industrial recycling by approving rate increases under the limited criteria applied in its general revenue proceedings. Under Section 204 it was up to the Commission to eliminate these barriers, after a complete investigation of the rate structures in this proceeding.

Moreover, we reject the view⁶² that Congress in some manner defeated the purpose of this investigation by its inclusion of Section 204 within the framework of the Regulatory Reform Act. As we have recently observed, this Act was not only a legislative enactment designed

⁶⁰ S. Rep. No. 94-499, 94th Cong., 1st Sess. 51 (1975).

⁶¹ 121 Cong. Rec. 38450-38451.

⁶² The Commission stated that it was required to consider the railroads' needs for revenues before ordering removal of the unlawful rates. Order at 74. We believe the Commission was authorized to consider financial impacts of particular rate structures on the railroads in determining the lawfulness of the rates, but was not entitled to give this factor the predominant weight that has been suggested in order to approve otherwise unlawful rate structures. Section 204, in our view, directed the Commission to order removal of unlawful rate structures, regardless of their effect on the railroads' revenue levels.

"to restore the financial stability of our railway system and promote its revitalization," but was also an expression of congressional concern "that the interests of the railroads be balanced with the needs of shippers and the public."⁶³ Section 204, dealing with an area of importance to the nation's environment, struck the balance Congress deemed appropriate after its consideration of the interests involved. In so doing Congress tilted the scales against existing rate structures fostered by the Commission in its general revenue proceedings. It was not for the Commission to disagree with this legislative judgment by giving greater weight to concerns for railroad profitability than to the environmental and energy goals underlying the investigation.

III

We agree with the dissenting Commissioners that on this record the Commission's approval of the rate structures was not consistent with its mandate. The challenged order does not meaningfully address the focal question presented by its investigation, namely whether the substantial rate disparities between recyclable and virgin products are justified, in whole or in part, by the transportation characteristics of the products involved. The Commission, by finessing this and other questions,⁶⁴

⁶³ *Atchison, Topeka & Santa Fe R. Co. v. ICC [Market Dominance]*, — F.2d —, — (D.C. Cir. No. 76-2048, decided May 2, 1978) (slip op. at 5, 6).

⁶⁴ We note that the Commission made no formal findings with respect to the existence of rate disparities, made no attempt to analyze cost evidence with respect to movements of the materials investigated, and did not require the railroads to adduce proof on the subject of potential competitive injury to shippers resulting from the rate structures. In effect, therefore, the Commission performed a circuitry: it substituted its environmental analysis of the impact of past rate increases for an economic analysis of the alleged unreasonableness and

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effectively relieved the railroads of their burden of proof under Section 204.

Even reviewing the Commission's order on its own terms, we also find that several of its underlying findings and conclusions are inadequately supported and arbitrary. Applying a standard of competition which was both unduly narrow and inconsistent with its Section 204 mandate, the Commission again found that recyclable and virgin products do not compete for transportation purposes. These findings, based more on the Commission's perceptions of industry structures than on articulated determinations with respect to rate structures, neither comport with the Commission's mandate nor rationally flow from the record before us. Since the Commission was required in this proceeding to supply a reasoned decision with respect to two issues—whether the rate structures were shown to be reasonable and whether they were shown to be not unjustly discriminatory—we shall discuss the Commissions on each of these aspects separately.

A. Reasonableness Issues

The Commission determined that in ascertaining the reasonableness of the rate structures it would not consider the rates on recyclables to be unreasonable unless they had resulted in a diminished volume of traffic during past years, or unless it appeared that recyclable materials could not absorb current rates.⁶⁵ It applied no

unjust discrimination in rate structures, and concluded that the rate structures were lawful because rate increases had not, in its view, resulted in actual harm to shippers of recyclables. Section 204 directed the Commission to address, and require proof from the railroads on, the issues—whether the rate structures were unreasonable or unjustly discriminatory—not to conduct a shell game.

⁶⁵ Order at 67.

other standard of reasonableness⁶⁶ and offered no explanation for its decision to focus exclusively on these criteria. Moreover, despite evidence of unusually high rate structures, the Commission refused to articulate a standard of maximum reasonableness for recycled products, stressing instead the need to consider in all instances the “public interest in a viable and efficient railroad industry”⁶⁷ and “the maintenance of adequate revenue levels for the railroads”⁶⁸ in determining the reasonableness of the rate structures.

As we have stated, the Commission was clearly authorized by Section 204 to apply traditional ratemaking criteria in this investigation. And we recognize that among such criteria the Commission normally is entitled to consider as one factor the effect of rates in terms of the volume of traffic moved. In view of the Commission's mandate in this proceeding and the evidence before it, however, we do not believe its decision to focus exclusively on this factor constituted an application of “satisfactory”⁶⁹ or “proper and legal

⁶⁶ Among the many variables the Commission has considered in the process of assessing the reasonableness of rates are: cost of service, value of service, the existence *vel non* of competition, the transportation characteristics of the commodity (weight, size, density), the anticipated volume of shipments, the distance of the haul, the availability of return loads, the economic status of the industry, the rate level required to move the traffic, the threat of intermodal competition, and comparisons with established rates for comparable shipments in the territory involved. *See, e.g., Burlington Northern, Inc. v. United States*, 555 F.2d 637, 640 (8th Cir. 1977).

⁶⁷ Order at 70.

⁶⁸ *Id.* at 74.

⁶⁹ *Chicago Board of Trade v. Illinois Central R. Co.*, 329 U.S. 529, 533 (1967) (reasonableness of rates may be determined “in relation to any satisfactory standard which permits [the Commission] to measure and determine the factual question presented”).

standards."⁷⁰

The most salient theme that stands out in the legislative history of Section 204 is that Congress did not regard the existing rates on recyclables to be lawful *solely* because these materials could withstand rate increases and continue to move by rail. Congress, as we have seen, was concerned with rate barriers to *increased* levels of recycling, as well as with the maintenance of existing ones. It believed, based on the data and information before it, that removal of unreasonableness (and discrimination) in rate structures would serve to promote an increase in the amount of industrial recycling, consistent with its environmental and energy goals. By applying, as an exclusive legal standard in this investigation, one which was designed to insure only maintenance of the *status quo* in the volume of recyclable traffic, and not one capable of measuring the effect of rate structures in terms of promotion of industrial recycling, the Commission thwarted the purpose of this investigation.

It is true that the freight commodity statistics submitted by the railroads and the elasticity studies relied upon by the Commission indicated that the volume of traffic for most recyclables did not decrease in response to previous rate increases. Such evidence, while probative, was hardly conclusive on the question whether the rate structures were impeding development of *increased* recycling.⁷¹ The probative value of both types of evidence,

⁷⁰ *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 415 (1970).

⁷¹ Data showing a constant or even a growth in consumption of recycled materials despite rate increases do not necessarily show that freight rates are inconsequential. As indicated by the Commission in previous proceedings, *see* note 16 *supra*, consumption might have been materially higher or lower had rates been different in the years of rate increases. Even in this

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moreover, rests entirely on their shared assumption that the rate structures themselves are not unreasonable or unjustly discriminatory.⁷² The clear purpose of this investigation, however, was to test the validity of this underlying assumption, one upon which the Commission has been operating for years, not summarily to adopt it. Neither the standard applied by the Commission nor the evidence before it, therefore, was adequate to enable it to conclude, consistent with its mandate, that these rate structures were reasonable.

Other deficiencies in the evidence relied upon by the Commission also lead us to conclude that its determinations on these issues are inadequately supported and arbitrary. As the Commission itself acknowledged,⁷³ a great void exists in this record due to the absence of any evidence concerning the effect of the rate structures on intermodal competition. Given the substantial disparities in the rates applicable to these products, such evidence may well have been material in determining the reasonableness of the rate structures. It may be, for example, that greater equality in the rates would result in di-

proceeding the Commission has effectively admitted that only a multi-variate analysis would adequately enable it to isolate the effect of transportation costs on consumption of recycled products. Given these shortcomings, we doubt whether such data alone would warrant the dispositive findings made by the Commission under any circumstances. *See* text and notes at notes 75-77 *infra*.

⁷² Order at 76 ("Conclusions on elasticity are limited to the range of prices experienced in the data base."). Since the range of prices used in the Commission's data base included only those associated with the rate increases, the validity of its conclusions with respect to the effects of rate structures necessarily depends on an assumption that the price ranges are identical with, or significantly representative of, those experienced throughout the rate structures.

⁷³ Order at 100.

version of traffic for some or all of these products to competing modes. We need not consider the question whether evidence showing that lower rates on recyclables or higher rates on virgin products would endanger the railroads' ability to carry the traffic might have been sufficient to permit the Commission to approve these rate structures, for we believe the question is one that required an initial determination by the Commission. On the present record, however, there is no basis to enable either this court or the Commission to make an informed determination on the matter.

Beyond this inadequacy in the record, we note that the heavy, and often impressionistic, weight⁷⁴ given by the Commission to the elasticity studies in this proceeding was plainly unwarranted. The Commission itself admitted the inherent limitation of such studies when used to determine the lawfulness of rate structures.⁷⁵ Moreover, its findings in a recent report prepared pursuant

⁷⁴ See, e.g., Order at 151 (fly ash); 219, 220 (aluminum scrap); 221 (aluminum ash); 222, 225 (aluminum residue); 261 (copper scrap); 262, 264 (copper matte); 305, 307 (lead scrap); 309-310 (zinc scrap); 318 (tin scrap); 325, 333-334 (waste paper); 351-352 (textile wastes); 371 (cullet); 398-399 (reclaimed rubber); 402-406 (bakery refuse); 414-415 (steel containers).

⁷⁵ The Commission observed: "few products * * * have the same demand elasticity for the entire range of prices. Demand may be inelastic for a limited range of prices and become elastic above that range." Order at 54. The Commission also stated that "aggregate studies only describe the collective impact of rate changes for a broad category of commodities. They give no indication of how individual shippers are affected." *Id.* at 56. In other words, the Commission acknowledged that these studies are relevant only as a general proposition, and only for the specific period of time investigated. The conclusions thus have limited relevance to the effects of high rate structures on particular products.

to Section 202 of the Regulatory Reform Act⁷⁶ to the effect that practically all commodities are demand inelastic to freight rate structures indicate that such studies may have no special significance with respect to the rate structures on recyclable products. We need not, and thus do not, question the validity of the Commission's elasticity studies⁷⁷ in order to observe that its approval of the rate structures, based in several instances solely on the results of these studies, was arbitrary in light of their admitted limitations and the findings of this report.

Finally, we stress that the Commission was not permitted in this investigation to maintain high rates on recyclables based on general assertions by the railroads concerning the profitability of recyclable traffic and their needs for additional revenues. While we agree with the

⁷⁶ Section 202(g) of the Regulatory Reform Act, 49 U.S.C. § 1(5)(g). The Commission found that, particularly with respect to most manufactured commodities, "the freight rate represents such a small percentage of the total delivered price of the product * * * that major increases in transport prices will not cause significant product demand shifts but may affect modal choice." INTERSTATE COMMERCE COMMISSION, THE IMPACT OF THE IMPACT OF THE 4-R ACT RAILROAD RATEMAKING PROVISIONS 102 (1977).

⁷⁷ Petitioner NARI, challenging both the accuracy and the relevance of the Commission's elasticity studies, appears to contend that under no circumstances may the Commission consider such evidence in determining the lawfulness of the rate structures. Petitioner NARI's supplemental brief at 5-6. We disagree. Where the Commission erred here is that it accorded virtually dispositive weight to evidence, having by its own admission limited significance to a determination of the issues presented, without fully considering other evidence directly relevant to those issues. The Commission is not prohibited from taking such evidence into account, provided it otherwise adheres to its mandate by examining traditional factors related to the transportation of commodities, and it articulates a rational basis for attributing significance to it.

Commission that it was not required by Section 204 to establish a maximum reasonableness standard applicable to all recycled products, we have no doubt that it was prohibited from approving rate structures unless they were shown to be justified by the transportation characteristics of the particular products. To us, this means that the Commission was compelled by Section 204 to scrutinize the railroads' cost justifications for current rate levels, and that it was insufficient to conclude that the rates were reasonable merely because these levels were profitable for the railroads or because recyclable traffic would continue to move by rail at the railroads' current revenue levels. It may be that, having examined fully the transportation characteristics of the products involved, the Commission might have determined to fix a maximum reasonableness standard for recycled products. And in measuring the appropriate standard the Commission might even have allowed for a reasonable margin of profitability under the rate structures. It is not for us to determine at this stage whether this course, if pursued, would have been proper, or precisely how a maximum reasonableness standard should be measured,⁷⁴ since, owing to the Commission's failure

⁷⁴ Petitioner NARI devoted a substantial portion of its arguments to the contention that existing rate structures, when measured against guides applied in other rate situations, are unreasonable. In support of its position it relied on: (1) the Commission's 1972 Burden Study, INTERSTATE COMMERCE COMMISSION, RAIL REVENUE CONTRIBUTION BY COMMODITY AND TERRITORY FOR THE YEAR 1972, Statement No. 153-72; (2) the Commission's recently promulgated market dominance regulations, 49 C.F.R. § 1109.1, 41 Fed. Reg. 44183 (1976); and (3) the Commission's recent decision in *San Antonio, Texas, Acting By and Through Its City Public Service Board v. Burlington Northern, Inc.*, Docket No. 36180.

The essence of NARI's argument appears to be that the existing rate structures are unreasonable *per se* because they exceed standards announced in these proceedings by a wide

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to require proof on the transportation characteristics of these products, there is no basis in the record for these determinations. We leave these and the other questions alluded to for resolution by the Commission upon remand.

margin. In its Burden Study, for example, the Commission found that the average cost-revenue ratio on national traffic was 131.8%. A large number of the ratios developed by the Commission in this proceeding exceeded this figure. See note 35 *supra*. Similarly, many of the ratios were higher than the 160% ratio announced in the Commission's market dominance regulations as creating a rebuttable presumption that a carrier possesses market dominance over the service rendered under a proposed rate. 49 C.F.R. § 1109.1(g) (2). Finally, although the Commission did not analyze cost evidence in this proceeding, it appears that the rate structures on many of the recyclable products would be invalid under the Commission's *San Antonio* decision, in which it prescribed rates approximating the cost levels of the service therein involved.

The Commission contends that none of the standards suggested by NARI compel a finding of unreasonableness, or should be used to set a standard of maximum reasonableness, because they were not intended to establish the reasonableness of particular rates. Respondent's brief at 58-64. Moreover, the Commission asserts that the question of the reasonableness of the rate structures should not be dependent upon a cost standard, at whatever level such standard might be set. *Id.* at 58-59. Since costs alone have never been held to determine maximum reasonable rates, see, e.g., *General Motors Corp. v. New York Central R. Co.*, 311 ICC 622, 625, *aff'd*, 207 F.Supp. 641, 648 (E.D. Mich. 1962), *aff'd per curiam*, 324 F.2d 604 (6th Cir. 1973); *United States v. Great Northern R. Co.*, 293 ICC 341, 345 (1954); *Morrison-Knudson Co. v. Missouri Pacific R. Co.*, 308 ICC 205, 209 (1959), we agree that the Commission was neither required to limit its consideration to this criterion solely, nor compelled to establish a maximum standard of reasonableness based exclusively on cost-derived standards. Granting this much, however, does not lead us to conclude that the Commission was entitled, as it has, to ignore any consideration of costs. Section 204, as we have stated, required it to determine the lawfulness of the rate structures based on a

[continued]

B. Discrimination Issues

The Commission stated that in determining whether the rate structures were unjustly discriminatory it would be guided by its "traditional standards" under Section 3(1) of the Interstate Commerce Act,⁷⁹ and would therefore conduct a four-step analysis. The four steps listed by the Commission were: (1) whether disparities exist between the ratios for recyclable and virgin materials; (2) whether there is "in fact" competition between these materials; (3) whether shippers of recyclables are being

complete investigation of the transportation characteristics involved.

Nor does our rejection of NARI's argument inevitably support the view that the Commission was not authorized in this investigation to establish a maximum standard of reasonableness. In this regard, we note that the market dominance regulations promulgated by the Commission under the Regulatory Reform Act were designed to assist it in focusing on areas where maximum rate regulation is needed in the public interest. It may be that during the course of an investigation conducted consistent with its mandate under § 204 the Commission would decide that some equivalent standard would serve a similar purpose concerning rates on recyclables.

⁷⁹ It shall be unlawful for any common carrier subject to the provisions of this chapter to make, give, or cause any undue or unreasonable preference or advantage to any particular person, company, firm, corporation, association, locality, port, port district, gateway, transit point, region, district, territory, or any particular description of traffic, in any respect whatsoever; or to subject any particular person, company, firm, corporation, association, locality, port, port district, gateway, transit point, region, district, territory, or any particular description of traffic to any undue or unreasonable prejudice or disadvantage in any respect whatsoever: *Provided, however*, That this paragraph shall not be construed to apply to discrimination, prejudice, or disadvantage to the traffic of any other carrier of whatever description.

49 U.S.C. § 3(1) (1970).

injured by the rate disparities; and (4) whether rate disparities are justified by differences in the transportation characteristics of the materials involved.⁸⁰ Applying these standards, it concluded that most of the recyclable materials did not in fact compete with their virgin material counterparts, and that shippers of all of the recyclable materials were not competitively injured by existing rate structures. As it had in addressing the issue of the reasonableness of the rate structures, the Commission again avoided an examination of the transportation characteristics of the various products, in this instance by concluding its analysis at the third of these criteria.

We agree with the Commission's initial determination to consider the discrimination issues within the framework of the broad prohibitions provided by Section 3(1).⁸¹ Moreover, we concur in the Commission's view that resolution of the discrimination issues in this pro-

⁸⁰ Order at 72. The Commission thus introduced a novel element, competition in fact, into its traditional § 3(1) inquiry. In typical § 3(1) cases the Commission has required a showing that a party is "competitively injured, actually or potentially." *Id.* at 72 n.20. See also *Chicago Board of Trade v. Illinois Central R. Co.*, 344 ICC 818, 831 (1973).

⁸¹ The Commission's initial position was that it "should not restrict" itself to viewing its investigation under § 2 of the Act, 49 U.S.C. § 2 (1970), which prohibits unjust discrimination between like kinds of traffic under substantially similar circumstances and conditions, but also should consider the prohibitions under § 3(1). *Id.* at 71. To the extent that the Commission's subsequent application of § 3(1) standards may have reflected a view that it was not required to examine the transportation characteristics of these products, see *id.* n.19a, this determination was inconsistent with its mandate. We note, however, that according to its statement of the criteria applied under § 3(1), the Commission was required to consider whether differences in the transportation characteristics justified disparities in ratios. *Id.* at 72.

ceeding required it to consider carefully the competitive relationships between the materials involved. We hold, however, that on this record the Commission's findings of no competition in fact, and no actual competitive injury, were inconsistent with its mandate.

Turning first to the Commission's findings of no competition, we note that an obvious concern of Congress in enacting Section 204 was to ensure that the Commission take into account the full competitive relationships between recyclable and virgin commodities. In its general revenue proceedings the Commission had rejected challenges to rate increases, concluding consistently that recyclable and virgin products did not compete for transportation purposes because their competitive relationships were complementary. As in this proceeding, therefore, the Commission applied a standard of competition requiring a showing that recyclable products were substitutable for, rather than functionally equivalent with, virgin products in the manufacture of industrial products. In the view of some members of Congress this standard was unduly narrow and its application by the Commission had resulted in approval of freight rates which retarded rather than promoted industrial use of recycled products. The pertinent passages of the legislative history of Section 204⁸² suggest further that these

⁸² Senator Tunney, the sponsor of the amendment to § 204 placing the burden of proof upon the railroads, stated that "the investigation must proceed with an articulation of a presumptive standard of competition. For the purpose of this investigation, the Commission should consider recyclable and virgin materials to be competing if they are functionally equivalent in the manufacturing stage." 121 Cong. Rec. 38451 (1975). In a similar vein, the Senate Commerce Committee Report stated: "[T]he record * * * indicates that the Commission may not be taking into account the full competitive relationship * * *. A reexamination of that relationship will be necessary if this investigation is to achieve its goal." S. Rep. No. 94-499, 94th Cong., 1st Sess. 47 (1975).

proponents believed application of this standard would frustrate the purpose of the investigation required by the statute.

Although the competition standard employed by the Commission was thus an important area of congressional concern, it is evident from both the language of the statute and its remaining legislative history that it was not the main concern leading Congress to require this investigation. As we have previously stated, Congress' major concern was with removal of rate structures which impeded or discouraged development of industrial recycling. In light of this dominant purpose, and especially due to the absence of any statutory reference to the standard of competition to be applied, we are unable to conclude that Section 204 was a legislative directive to the Commission to make positive findings that these products compete for transportation purposes. Nor may we conclude that Congress meant to prescribe any particular standard of competition for application in this investigation. While, as indicated previously, some of the proponents of Section 204 believed that the Commission's investigation should proceed with a presumptive standard of competition based on the functional equivalency of the products in manufacturing processes, Section 204, by its terms, did not enact such a standard.⁸³

⁸³ To hold, as petitioners suggest, that the Commission was required by § 204 to find or assume that recyclable and virgin commodities compete would require us to give controlling weight to the remarks of Senator Tunney. We decline to do so not only because they are not supported by the language of § 204, but also because they were not adopted in the Senate Commerce Committee Report, which indicated instead that the Commission should "reexamine" competitive relationships consistent with the investigation's purpose of removing unlawful impediments to the movement of recycled materials. See note 82 *supra*. See also *Zuber v. Allen*, 396 U.S. 168, 186 (1970); *American Airlines, Inc. v. CAB*, 365 F.2d 939, 948 (D.C. Cir. 1966).

At the same time, giving effect to the specific mandate of Section 204—that the Commission order removal of unlawful rate structures found to discourage industrial recycling after a broad investigation—we believe that the Commission was not entitled to apply a competition standard so narrow in scope as to obviate the statutory purpose of its investigation. The lawfulness of the rate structures was not to be governed by the fact that recyclable products had been unable to attain actual competitive status with virgin products under existing rates. Instead, we believe that to warrant dispositive findings of no competition the Commission was required to find that the various products were neither actually nor potentially competitive for transportation purposes. The Commission was therefore required to consider the potential under the rate structures for competitive relationships between recyclable and virgin products, and for competitive injury to shippers. This standard, we might add, not only comports with the Commission's mandate, but is fully consistent with competition standards traditionally applied by the Commission in other discrimination cases.⁸⁴

When measured against this standard, the Commission's findings of no competition cannot be sustained. The Commission uniformly required a showing of competition "in fact" to establish discrimination, and concluded in each instance that the recyclable and virgin material counterparts were noncompetitive because they were not

⁸⁴ *Baltimore & Ohio R. Co. v. United States*, 391 F.Supp. 249, 259 (E.D. Pa. 1975) ("It was the potential for discriminatory treatment inherent in the practice which the Commission found to be violative of Sections 2 and 3(1).") See *Chicago Board of Trade v. Illinois Central R. Co.*, *supra* note 80. See also *Chicago & Eastern Illinois R. Co. v. United States*, 384 F.Supp. 298, 300-301 (N.D. Ill. 1974) (three-judge court), *aff'd*, 421 U.S. 956 (1975).

actually substitutable in manufacturing processes.⁸⁵ It made no findings, and was offered no evidence by the railroads, to the effect that the recyclable materials were not potentially competitive in manufacturing processes, in terms of either their substantiality or their functional equivalency. As we have indicated, it was patently insufficient for the Commission to approve rate structures on recyclables without consideration of such evidence, for to do so was to contravene its mandate in this proceeding.

It follows from our discussion that the Commission's alternative findings of no competitive injury also may not be sustained. Based on the same evidence relied upon in determining the reasonableness of the rate structures,⁸⁶ the Commission invariably concluded that shippers of recyclables had not suffered actual injury as a result of disparate rate treatment. That evidence, as we have seen, does not support a finding that the rate structures do not present a potential for competitive harm to shippers of recyclables. Instead, it only reflects the responsiveness of the relatively small amount of recyclables shipped to the recent rate increases approved by the Commission. It does not measure the effects of the rate structures on recyclable traffic. Nor does it account for increases in recyclable traffic that may have occurred absent the effects of the rate structures.

Unable to discern from this record any support for the Commission's findings on the discrimination issues, we set them aside, leaving for the Commission's determination such questions as may be involved in the assessment of the potential competition and competitive injury

⁸⁵ See, e.g., Order at 106, 220-221, 398.

⁸⁶ See text and notes at notes 71, 74-76 *supra*.

presented by these rate structures.⁸⁷ Recognizing the breadth of the competition standard the Commission will be required to apply, however, we note that only extraordinary circumstances, not disclosed by this record, will warrant another effort by the Commission which omits consideration, under a Section 3(1) analysis, of the issue whether disparities in the rate structures are justified by differences in the transportation characteristics of these products.

IV

Before concluding, we stress that we are unimpressed with the Commission's attempt to excuse its failure to comply with its mandate by repeated reference to the expedited nature of this investigation. The Commission has for a long time promised, and was finally compelled by Section 204, to resolve the longstanding controversy related to these rate structures. In light of the Commission's general familiarity with the issues involved, and the fact that a significant portion of the extensive record compiled consists of incorporated matter predating its investigation, the proffered excuse is untenable. This is not a case where an agency's determinations are or should be accorded an unusual degree of deference by a reviewing court because of the novelty of the issues and the time constraints within which the agency must operate.⁸⁸

⁸⁷ There are indications on this record that some, if not all, of the rate structures present potential for competitive harm to shippers. *See, e.g.*, Order at 132 ("price and availability of raw materials" found to be one factor affecting a manufacturer's determination to build a scrap-consuming electric furnace). In order to meet their burden of proof on this issue, the railroads should at a minimum be required to survey existing and potential users of recyclables to determine whether reductions in rates would encourage them to purchase more or make additional use of recyclable materials.

⁸⁸ *See Market Dominance*, *supra* note 63, — F.2d at —, slip op. at 12-13; *American Public Gas Ass'n v. FERC*, —

[continued]

On the other hand, although we disagree with the Commission's actions on this record, we also emphasize that our discussion of the standards employed by the Commission to determine the lawfulness of these rate structures, and of the evidence submitted by the railroads, is not intended to set forth our view of the lawfulness of any of the rate structures involved. They may be lawful, or they may not. In either event, it was not for the Commission to decide initially based on an adequately supported consideration of the transportation characteristics of the products consistent with its mandate. We have concluded only that the Commission has not done so in this case.

Nor, by our disposition, do we mean to intimate any view on the several contentions advanced relating to the measures the Commission should adopt in proscribing either maximum rates or recyclables or maximum rate disparities between recyclable and virgin products. All of these questions we leave to the informed judgment of the Commission, after full consideration of the railroads' justifications for disparities in the rate structures and the effect of the rate structures in terms of their actual and potential impact on the use of recycled products.

With these closing admonitions, we conclude that the Commission has not reasonably adhered to its mandate in this proceeding. Accordingly, we vacate the order under review in Nos. 77-1187 and 77-1292 in its entirety, and remand the case for further proceedings consistent with this opinion. We also dismiss the petition for review in No. 77-1193.⁸⁹

So ordered.

F.2d —, — (D.C. Cir. 1978) (*per curiam*) (slip op. at 17-18).

⁸⁹ *See* note 1 *supra*.

APPENDIX A

Section 204 of the Railroad Revitalization and Regulatory Reform Act of 1976, P.L. 94-210, 45 U.S.C. § 793, provides:

INVESTIGATION OF DISCRIMINATORY FREIGHT RATES
FOR THE TRANSPORTATION OF RECYCLABLE OR
RECYCLED MATERIALS

Sec. 204. (a) INVESTIGATION.—The Commission, within 12 months after the date of enactment of this Act, and thereafter as appropriate, shall—

(1) conduct an investigation of (A) the rate structure for the transportation, by common carriers by railroad subject to part I of the Interstate Commerce Act, of recyclable or recycled materials and competing virgin natural resource materials, and (B) the manner in which such rate structure has been affected by successive general rate increases approved by the Commission for such common carriers by railroad;

(2) determine, after a public hearing during which the burden of proof shall be upon such common carriers by railroad to show that such rate structure, as effected by rate increases applicable to the transportation of such competing materials, is just, reasonable, and nondiscriminatory, whether such rate structure is, in whole or in part, unjustly discriminatory or unreasonable;

(3) issue, in all cases in which such transportation, rate structure is determined to be, in whole or in part, unjustly discriminatory or unreasonable, orders requiring the removal from

such rate structure of such unreasonableness or unjust discrimination; and

(4) report to the President and the Congress, in the annual report of the Commission for each of the 3 years following the date of enactment of this Act, and in such other reports as may be appropriate, all actions commenced or completed under this section to eliminate unreasonable and unjustly discriminatory rates for the transportation of recyclable or recycled materials.

(b) PARTICIPATION.—The Administrator of the Environmental Protection Agency shall take such steps as are necessary to assure that the Commission carries out the requirements set forth in subsection (a) of this section as expeditiously as possible. Such Administrator is authorized to participate as a party in the investigation to be commenced by the Commission under such subsection (a).

(c) RESEARCH, DEVELOPMENT, AND DEMONSTRATION.—The Secretary, in cooperation with the Commission, shall establish a research, development, and demonstration program to develop and improve transport terminal operations, transport service characteristics, transport equipment, and collection and processing methods for the purpose of facilitating the competitive and efficient transportation of recyclable or recycled materials by common carriers by railroad subject to part I of the Interstate Commerce Act.

(d) REVIEW.—Orders issued by the Commission pursuant to this section shall be subject to judicial review or enforcement in the same manner as other orders issued by the Commission under the Interstate Commerce Act. In all proceedings under this

section, the Commission shall comply fully with the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. § 4321 *et seq.*).

(e) DEFINITIONS.—As used in this section, the term—

(1) “recyclable material” means any material which has been collected or recovered from waste for a commercial or industrial use, whether or not such collection or recovery follows end usage as a product; and

(2) “virgin natural resource material” and “virgin material” mean any raw material, including previously unused metal or metal ore, woodpulp or pulpwood, textile fiber or material, or other resource which is, or which will become (through the application of technology), a source of raw material for commercial or industrial use.

(Title Omitted in Printing)

Filed August 7, 1978

Before: WRIGHT, Chief Judge.

ORDER

It is ORDERED, *sua sponte*, that the opinion of the Court filed August 2, 1978, is hereby amended as follows:

Page 4, note 1. Delete phrase “and remanding” in sixth line from the bottom of the page.

Page 4, note 1. Add date “August 2” in last line.

Page 5, note 3. Revise to read: *See* p. 17 & note 42 *infra*.

Page 9, note 15. Revise page citation to read: *see* pp. 28, 30-31, & notes 71-72 *infra*.

Page 13, line 1. Change “require” to “required”.

Page 16, note 39. Delete “*See* text and note at note 75 *supra*.”

Page 20, line 2. Revise “As interpreted elsewhere” to read “As has been interpreted elsewhere”.

Page 21, line 4. Change “structure” to “structures”.

Page 26, line 19. Revise to read: “—we shall discuss the Commission’s determinations on each of these”.

Page 39, line 5. Substitute “substitutability” for “substantiality”.

Page 40, note 88. Change “*See*” to “*Cf.*”.

Page 41, line 9. Delete “not”; sentence should read “was for the Commission to decide initially based on”.

Page 41, line 17. Change first “or” to “on”; sentence should read “either maximum rates on recyclables or maximum rate”.

(Title Omitted in Printing)

Filed August 25, 1978

Before: WRIGHT, Chief Judge.

ORDER

It is ORDERED by the court, *sua sponte* that the opinion of the court filed August 2, 1978 be, and it is hereby, amended as follows:

Page 13, note 30. Change "(JA 341)." to read "(JA) 341." in line 1.

Page 14, note 31. Delete period at the end of the 4th line from the end.

Page 31, note 76. Delete the 4th, 5th, and 6th words, "IMPACT OF THE", in the next to last line.

Page 35, note 81. Change "*Id.*" in line 6 to "Order".

Page 35, text. Change "characteristics" in line 11 to "characteristics".

Page 41, note 88. Change "(D.C. Cir. 1978)" to read "(D.C. Cir. No. 75-2105, decided May 10, 1978)".

Page 42, text. Delete first comma in the third line from the bottom.

Per Curiam

For the Court

/s/ ROBERT A. BONNER
Robert A. Bonner
Chief Deputy Clerk

(Title Omitted in Printing)

Filed September 6, 1978

Before: WRIGHT, Chief Judge

ORDER

It is ORDERED by the court, *sua sponte*, that the opinion of the court filed August 2, 1978 in the above cases be, and it is hereby, amended as follows:

Page 27 Delete quotation mark preceding the word "proper" in the last line of text.

Footnote 69 is amended to read:

Chicago Board of Trade v. Illinois Central R. Co., 329 ICC 529, 533 (1967) (reasonableness of rates may be determined "in relation to any other satisfactory standard which permits [the Commission] to measure and determine the factual question presented").

Page 28 Delete quotation mark following the word "standards." in the first line of text.

Footnote 70 is amended to read:

Burlington Northern, Inc. v. United States, 549 F.2d 83, 88 (8th Cir. 1977).

Per Curiam

For the Court

/s/ GEORGE A. FISHER
George A. Fisher
Clerk

APPENDIX C

APPENDIX C

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT
SEPTEMBER TERM, 1978

No. 77-1187

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES, INC.,
Petitioner

v.

INTERSTATE COMMERCE COMMISSION and UNITED STATES OF
AMERICA, *Respondents*

ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY, ET AL.,
Intervenors

And Consolidated Cases Nos. 77-1193 & 77-1292

Filed October 16, 1978

Before: WRIGHT, Chief Judge, and SWYGERT* and LEVEN-
THAL, Circuit Judges.

ORDER

The court has before it petitioner's petition for rehearing and modification of this court's order of August 2, 1978, the response thereto of the Interstate Commerce Commission, and the opposition thereto of the intervenors herein. On consideration thereof, and for the reasons stated in the following *per curiam*,

It is ORDERED by the court that the Interstate Commerce Commission complete its action on remand within six (6) months of the date of this order.

For the Court

/s/ GEORGE A. FISHER
George A. Fisher
Clerk

* Of the Seventh Circuit, sitting by designation pursuant to 28 U.S.C. § 291(a) (1976).

Circuit Judge LEVENTHAL dissents.

PER CURIAM: As the court indicated in its opinion in this case filed August 2, 1978, Section 204 of the Regulatory Reform Act of 1976 directed the Interstate Commerce Commission to conduct an expedited investigation into the lawfulness of certain rate structures and to order removal of all rates not shown by the railroads to be just, reasonable, and nondiscriminatory. The date of the legislation is February 5, 1976, and Section 204 provides that the investigation be concluded within one year of that date. The investigation culminating in the orders under review here met this timetable, but on August 2, 1978 we vacated the orders of the Commission and remanded the case to the Commission. Thus two and a half years after passage of this "expedited" legislation the Commission is back at Square One.

Petitioner in its motion suggests that at the least the Commission should be required to complete proceedings on remand within six months, whereas the Commission and the railroads suggest that the Commission should have an indefinite time to comply with the congressional mandate of expedition.

It is this court's view that the congressional mandate of expedition should be respected to the extent possible, given the current delay. Not only should Commission action on remand be expedited, but judicial review thereof, if any, should be as well.

LEVENTHAL, *Circuit Judge, dissenting*: I do not believe we should enter an order now specifying a six-month period for completing the investigation required by our opinion. I would agree to an order requiring the ICC to make a report within six months if the investigation has not been completed, indicating the state of affairs and explaining why more rapid progress has not been made. The difference is not cataclysmic—for even under the present order, the ICC can return and ask for an extension of time. But the

difference is not merely one of form. The court's order presupposes a capacity to judge how long this investigation should take, and I have no basis for a reasoned judgment on that score.

APPENDIX D

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APPENDIX D

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INTERSTATE COMMERCE COMMISSION

EX PARTE NO. 319

**INVESTIGATION OF FREIGHT RATES FOR THE
TRANSPORTATION OF RECYCLABLE OR RECYCLED
COMMODITIES**

TABLE OF CONTENTS

	Page
Introduction and History of the Proceeding	115
Evidence Requested and Presented	117
Method of Analysis and Decisionmaking	156
Table I Commodities	
Scrap iron and steel	160
Blast furnace, open hearth, rolling mill or coke oven products and fly ash	218
Aluminum	221
Copper	274
Lead and zinc	301
Tin	334
Pulpwood, woodchips, wood pulp and waste paper	339
Textile waste	371
Cullet	384
Rubber	396
Table II Commodities	
General	417
Bakery waste	419
Shavings or sawdust	420
Beverage containers	422
Steel containers	424
Wood scrap or waste	425
Municipal garbage waste	426
Bags	427
General Discussion and Conclusions	427
Ultimate Findings	431
Appendixes	434
Order	449
356 I.C.C.	

EX PARTE NO. 319¹

INVESTIGATION OF FREIGHT RATES FOR THE TRANSPORTATION OF RECYCLABLE OR RECYCLED COMMODITIES

Decided February 1, 1977

1. Upon investigation of the railroad freight rate structures for the transportation of recyclable or recycled materials and competing virgin, natural resource materials, and the manner in which such rate structure has been affected by general increases approved by the Commission.
2. Upon consideration of the record, found that the rate structures of the following commodities in the following territories are not unjustly discriminatory but are unjust and unreasonable: (a) aluminum residues in official, southern, and western territories; (b) miscellaneous nonferrous metal residues in official territory; (c) copper matte, speiss or flue dust in western territory; (d) cullet in official, southern and western territories; (e) reclaimed rubber in official and southern territories; (f) ashes in official and western territories; and (g) zinc dross in southern territory.
3. Upon consideration of the record, found that additional investigation into the reasonableness of the rate structures of the following commodities in the following territories is required: (a) miscellaneous nonferrous metal residues in southern territory; (b) copper matte in southern territory; (c) lead matte in southern territory; (d) wood scrap in western territory; (e) municipal garbage in official, southern and western territories; (f) bags, old in southern and western territories; (g) bags, old having value for conversion in official, southern and western territories; and (h) bakery waste in official, southern, and western territories.
4. Upon consideration of the record, found that the decisions made herein do not significantly affect the quality of the human environment within the meaning of the National Environmental Policy Act of 1969.
5. Upon consideration of the record, found that the railroads should alter their tariff definition of recyclable to conform with that found in section 204(e)(i) of the Railroad Revitalization and Regulatory Reform Act of 1976.
6. Proceeding discontinued except as otherwise ordered.

A. C. Armstrong, Harry N. Babcock, Donald W. Boe, John A. Daily, William C. Farris, George M. Gallamore, R. W. Kienle, W. C.

¹Includes Ex Parte No. 270 (Sub-No. 5), *Investigation of Railroad Freight Rate Structure—Iron Ores*, and Ex Parte No. 270 (Sub-No. 6), *Investigation of Railroad Freight Rate Structure—Scrap Iron and Steel*.

356 I.C.C.

Leiper, Charles N. Marshall, R. J. Murphy, Sr., S. P. Petraities, C. C. Rettberg, Jr., James E. Sykes, D. M. Tohmie, and Donald L. Turkal for respondent railroads.

J. Raymond Clark, John F. Donelan, Maurice A. Frater, and John K. Maser III, for supporting shippers.

Eston H. Alt, William C. Anderson, Ralph H. Bell, C. J. Berretta, William Betcher, Michael M. Briley, Dennis Burg, J. Raymond Clark, Richard D. Cooper, Donald R. D'Argento, Elliot L. Davis, N. L. Gershon, Arthur Goldman, John W. Gosselin, Howard Gould, John S. Grahm, Morris Hershorn, H. J. Hussman, Dickson R. Loos, L. D. Mangan, Edward L. Merrigan, Paul V. Miller, Maynard L. Moore, Jr., Theodore A. Newman, Kenneth R. Pepperney, Ross H. Prater, Warren Price, Jr., Robert B. Reedy, David Reichert, Russell R. Sage, Dan E. Sauve, William L. Slover, David H. Smith, D. A. Sommer, Stephen D. Strauss, Al Super, James H. Thrash, Robert F. Toia, and Paul P. Watkins for opposing shippers.

G. William Frick for the Environmental Protection Agency.

Joseph C. Lynch and Hydee C. Thompson for the Special Projects Staff, Bureau of Enforcement.

REPORT AND ORDER OF THE COMMISSION

BY THE COMMISSION.

INTRODUCTION AND HISTORY OF THE PROCEEDING

The institution of this investigation was mandated by Congress in section 204 of the Railroad Revitalization and Regulatory Reform Act of 1976 (the 4R Act) which became law February 5, 1976. Section 204, as is here pertinent,² directs the Commission to investigate, (a) the rate structure of the railroads for the transportation of recyclable or recycled materials (recyclables) and competing virgin natural resource materials (virgin materials or virgin commodities)³ and, (b) the manner in which such rate

²The full text of section 204 is set forth in appendix A.

³Section 204(e) defines "recyclable materials" as "any material which has been collected or recovered from waste for a commercial or industrial use, whether or not such collection or recovery follows end usage as a product." "Virgin natural resource material" and "virgin material" mean any raw material, including previously unused metal or metal ore, woodpulp or pulpwood, textile fiber or material, or other resource which is, or which will become (through the application of technology), a source of raw material for commercial or industrial use. Prior to the enactment of this provision the Commission has sought to encourage the movement of recyclables, see for example, *Transportation of "Waste" Products for Reuse*, 124 M.C.C. 583 (1976).

356 I.C.C.

structure has been affected by successive general freight rate increases. The burden of proof is on respondents. The Commission must determine whether such rate structure is, in whole or in part, just, reasonable and not unjustly discriminatory. If we find the rate structure, in whole or in part, to be unreasonable or unjustly discriminatory, we are to issue orders requiring the removal of such unlawfulness. Section 204 requires the Commission to complete its investigation and make its findings by February 5, 1977.

Pursuant to this mandate the Commission, in an order⁴ served February 25, 1976, instituted this proceeding stating that determinations of discrimination were to be primarily based on comparison of cost-revenue relationships and the competitive relationship of the involved materials. The order included (a) a list of recyclable or recycled materials and their corresponding standard transportation commodity code (STCC) numbers, (b) a format for the presentation of evidence,⁵ and (c) a bibliography of studies concerned with the relationships between recyclable and virgin materials.

Through subsequent orders two tables evolved which contain the specific commodities under investigation. Table I contains a list of recyclable and recycled materials, and opposite it a list of their competing or potentially competing virgin natural resource materials. Table II contains a list of recyclable and recycled materials only. The Commission has no knowledge of nor have any of the parties in this proceeding made us aware, of a competing virgin natural resource material.⁶ The rate structures⁷ for the recyclables in table I have been investigated to determine whether they are reasonable and nondiscriminatory. The rate structures for the recyclables in table II have been investigated to determine whether they are reasonable since they apparently do not compete with virgin natural resource materials.

Ex Parte No. 270 (Sub-No. 5) *Investigation of Railroad Frt. Rate Structure*, 345 I.C.C. 548 (1976) and Ex Parte No. 270 (Sub-No. 6), *Investigation of Railroad Frt. Rate Structure*, 345 I.C.C. 867 (1976),

⁴See appendix B.

⁵This format will be discussed in detail later in this report.

⁶Tables I and II, as they have been finally constituted, are set out later in the report as well as in appendix C.

⁷Although section 204 uses the term "rate structure" this term refers to a single-entity composed of separately established, interrelated rates. *Western Traffic Assn.—Agreement*, 276 I.C.C. 183 (1949). This proceeding, on the other hand, examines numerous rate structures for recycled materials and competing virgin natural resource materials and will be used in that sense.

which are pending on exceptions and replies thereto have been incorporated in this proceeding, *infra*.

Special procedures were followed. After submission of 95 verified statements oral hearings were held at Washington, D.C., from October 5 to October 19, and from November 10 to November 12, 1976, on the 12 rebuttal statements filed by respondents. Briefs were filed on December 13, 1976, by the respondent railroads and participating shippers and shipper organizations. Reply briefs were filed on December 31, 1976.

Due and timely execution of our functions under section 204 of the 4R Act imperatively requires the omission of an initial decision by an Administrative Law Judge.

All evidence and arguments not mentioned have been considered and given due weight. Discussion of many of the various contentions have been omitted since their inclusion would unduly lengthen this opinion without advancing its disposition. Repetitions of arguments without elaboration or underlying support are omitted to the extent possible.

EVIDENCE REQUESTED AND PRESENTED

Format of investigation.—The Commission required the parties to divide their statements into seven parts. The first part was to be restricted to the historical evidence of costs and movement of recyclable and virgin materials. The carriers were to submit evidence on the movement of the commodities based on representative or repetitive rates as of October 11, 1975. The evidence was to be based on sample studies with the carrier justifying the relevance and validity of the procedures used, or based on rates under which large volumes of commodities moved in 1975. The carriers were required "to demonstrate the validity of any evidence submitted with respect to the representative or repetitive movements selected." An outline of the 17 categories of information desired was delineated.⁸

Respondents were required to determine the costs of these movements and whether the current rates reflect the differences in costs based on several factors.⁹ The following topics were requested

⁸The information required includes the: (1) commodity and STCC number; (2) origin and destination points; (3) origin rate territories; (4) type of rate; (5) rates in cents per ton at the October 11, 1973 level; (6) whether on multiple-car or trainload shipments rates were reduced from single-car rates; (7) tariff authority; (8) minimum weight per shipment in tons; (9) average weight in net tons; (10) average number of cars per shipment; (11) average weight per car; (12) car ownership; (13) car type; (14) route of movement; (15) carrier and miles; (16) average revenue per car; and (17) estimate of annual tonnage for period 1970-75.

⁹These factors included distance traveled, weight of shipment, special equipment, special handling, equipment utilization, and equipment maintenance.

to be discussed in the remaining parts: (2) evidence relating to the trend in utilization of recyclable and virgin material since 1966 and the effect thereon of general rate increases; (3) effect of increases or decreases in the rates on the substitutability between virgin and recyclable materials; (4) the likely effect of rate changes on individual railroads, revenues and profits; (5) the effect that rate changes have had and will have on service; (6) alternative rate structures were to be suggested; and (7) other pertinent evidence not considered elsewhere. Under this last part we have discussed environmental considerations.

The evidence submitted in Ex Parte No. 270 (Sub-Nos. 5 and 6) has been incorporated into this record. The movements presented in these earlier proceedings have been updated to the Ex Parte No. 313 level and additional movements were provided. A further discussion of the evidence presented, the conclusions of the Coordinator, and the exceptions thereto are contained in our discussion of "Scrap Iron and Steel and Iron Ore."

A bibliography of studies concerned with the relationship between recyclables and virgin materials was also attached to that order. Parties were encouraged to submit additions to comments on the bibliography. Additional material was requested to be listed in the bibliography by the National Barrel Association, Inc., and the Aluminum Association, Incorporated. Since no objection to the addition of this material has been made, the additional materials will be incorporated into the bibliography. (See appendix D.)

Investigated commodities.—In the February 25, 1976, order a list of 13 recyclable or recycled materials to be investigated by the Commission was presented. Participants in the proceeding were informed that suggestions for additions to or deletions from this list as well as a list of competitive or potentially competitive virgin natural resource materials could be made. Suggestions for the inclusion of additional competing and recyclable commodities were made by the parties and appropriate revisions were incorporated by the Commission. In the orders served on May 13 and June 11, 1976, respectively, the final list of recyclable and competing virgin materials was set forth. The commodities are listed in two tables. Table I which is shown below, contains a list of recyclable or recycled materials and their corresponding competitive or potentially competitive virgin natural resource materials.

356 I.C.C.

TABLE I

STCC No.	Recyclable or recycled materials	STCC No.	Virgin natural resource materials
22 941	Textile waste garnetted or processed.	24 114 10	Pulpwood or pulpwood logs
22 973 15	Noils, ramie	26 111	Pulp
22 973 25	Noils (Combing or comber waste), cotton.	22 999 26	Cotton linters, bleached or dyed
thru		22 971	Wool or mohair, carbonized or scoured.
22 973 68	Rovings, jute andistle (itile).	22 992	Jute goods, exc. bags
		22 995	Vegetable fibers, exc. cotton
22 994	Packing or wiping cloths or rags (processed textile waste).	28 213	Synthetic fibers, exc. glass
		22 119 74	Cotton piece goods
32 299 24	Cullet (broken glass)	26 111	Pulp
33 119	Blast furnace, open hearth, rolling mill, or coke oven product, nec.	14 413 10	Glass sand, unground
		10 1	Iron ores
33 312	Copper matte, speiss or flue dust, aao, dross, slag, skimmings, et cetera.	10 2	Copper ores
33 322	Lead matte, speiss or flue dust, aao, dross, slag, skimmings, et cetera.	10 3	Lead or zinc ores
33 332	Zinc dross, residues, ashes, et cetera.	10 3	Lead or zinc ores
33 342	Aluminum residues, et cetera	10 511	Crude bauxite ores
33 398	Misc. Nonferrous metal residues and	10 513	Calcinated or activated bauxite ores
40 1	Ashes		
40 211	Iron or steel scrap	10 1	Iron ores
40 212	Brass, bronze, copper or alloy scrap, aao, tailings or wastes.	10 3	Copper ores
40 213	Lead, zinc or alloy scrap, aao, tailings or wastes.	10 3	Lead or zinc ores
40 214	Aluminum or alloy scrap, aao, tailings or wastes.	10 511	Crude bauxite ores
		10 513	Calcinated or activated bauxite ores.
40 219 60	Tin scrap, value for remelting purposes, consisting of scrap or pieces of metallic, clippings, drippings, shavings, turnings or worn-out block tin pipe.	10 929 85	Tin ore (tin stone or cassiterite), crude.
40 24	Paper waste or scrap	24 114 10	Pulpwood or pulpwood logs
40 26	Rubber or plastic scrap or waste.	08 423	Latex gums (crude natural rubber), aao, allied gums.
30 3	Reclaimed rubber	28 212	Synthetic rubbers (vulcanizable elastomers), exc. fabricated rubber products.
40 22	Textile waste, scrap or sweepings.	26 111 40	Cotton linters pulp
		26 111	Pulp

See footnote on following page.

356 I.C.C.

¹Woodchips were not mentioned in any of our orders, however, they been contended to be a potentially competitive virgin natural resource material and, therefore, have been included in this investigation.

Table II contains a list of recyclable or recycled materials as to which no corresponding list of competing virgin materials is provided. This phase of the investigation is limited to the rate structure on these commodities alone and whether it is in whole or in part, unjust and unreasonable.

TABLE II

STCC No.	Recyclable or recycled material
20 511 18.....	Bakery refuse or sweepings, feed
24 292.....	Shavings or sawdust
34 912.....	Steel shipping containers, viz. steel drums
40 23.....	Wood scrap or waste
40 291 14.....	Municipal garbage waste, solid, digested, ground, other than fertilizer, exc. sewage waste.
41 114 34.....	Bags, old, burlap, gunny, jute or sisal, nec., inc. istle (ixtle)
41 115 80.....	Bags, old having no value for further use or reconditioning as bags, but having value for conversion into bale covering.
42 111 42.....	Beverage containers returned empty

The STCC numbers referred to in both tables also embrace all articles assigned additional digits listed thereunder in STCC Tariff I-D.

In the following discussion of "Evidence Presented," we will discuss the contentions and arguments of the parties which are applicable to all the investigated commodities. This general discussion and our conclusions to the points thereby raised, are for the purpose of eliminating repetitious arguments and for simplification in the presentation of the report. Specific issues related to individual commodities will be considered in the section for that commodity.

PART I

MOVEMENTS OF RECYCLABLE AND VIRGIN MATERIALS AND THEIR TRANSPORTATION CHARACTERISTICS

Respondents were required to submit evidence as to transportation of, and the rate structure on recyclable and virgin materials. They chose to submit evidence as to shipments which moved in volume; repetitive movements. A movement represents traffic moving between one origin and one destination point. The

356 I.C.C.

number of carloads between the two points may vary depending on the volume of traffic. (Originating traffic only was submitted to avoid duplication.)

Respondents submitted information as to some 3,000 rail movements. A standard form for reporting the requested information was developed by the carrier or carrier organization. An example of these forms is contained in appendix E. The movements were then analyzed and costed by the Traffic Executive Association—Eastern Railroads (TEA), the Southern Freight Association (SFA), or the Western Railroad Association (WRA).

In the East, approximately 800 repetitive movements were submitted. The choice of picking a particular "repetitive" movement was left to knowledgeable traffic personnel.

Consolidated Rail Corporation (ConRail),¹⁰ the Chessie System (Chessie), the Norfolk and Western Railway Company (N&W), and the Bessemer and Lake Erie Railroad Company (B&LE) used the following criteria in selecting examples of repetitive movements for ferrous and nonferrous metals:

- (a) Only repetitive movements were selected, although, in certain instances, it developed that the movements were few in number;
- (b) Originated traffic only was considered by reporting carriers for the purpose of reporting simplicity;
- (c) Switching movements were excluded, the reason being that those movements are not susceptible of immediate identification by computer program;
- (d) A wide variety of movements was sought; i.e., representative of:
 - (1) interterritorial and intraterritorial;
 - (2) interstate and intrastate;
 - (3) long-haul, medium-haul and short-haul;
 - (4) heavy-loading per car and light-loading per car;
 - (5) interplant and commercial;
 - (6) single line and joint line;
 - (7) multiple car and single car; and
 - (8) high volume and low volume.

They indicate that no attempt was made to select movements which reflected extremes in the range of rates and revenues.

For movements of recyclable and textile commodities and woodpulp and pulpwood, ConRail selected movements based on the following criteria:

- (1) Traffic originated on Penn Central.
- (2) Traffic volume greater than one car per year, implying "repetitiveness."

¹⁰ConRail submitted movements only for the Penn Central line because this was the most available information due to the recent formation of several eastern roads into ConRail.
356 I.C.C.

(3) Moves generally picked on the basis of largest volume of cars per year.

Exceptions:

(a) If all of the highest volume moves were originating from one origin, then one move would be selected from the set originating from that origin, and the following moves would be selected from other origins, even though their annual tonnage may have been lower, thus providing greater geographic coverage.

(b) In some instances, the traffic level for a particular STCC group was so small that all traffic moving from PC origins is covered by the repetitive moves, [thus eliminating the element of choice].

The Maine Central Railroad (MCR) and the Boston and Maine Corporation (B&M) generally selected repetitive movements based on 15 carloads. The MCR also showed its total tonnage and gross freight revenue and percentage relationship on which selected commodity movements bore to the total.

In the South, the method of selection was also decided by the individual carrier. The Southern Railway chose large volume movements with no rigid basis for selection. A minimum of 30 carloads between a pair of origin and destinations was generally used, except for pulpwood which has higher volume movements. However, where the commodity moved in smaller amounts, this also was submitted. It also showed the tonnage originated for a particular commodity and the tonnage included in the selected repetitive movements. In total, 42 percent of its recyclable traffic and 69 percent of its virgin material traffic was included by the representative movements.

The Illinois Central Gulf Railroad Company (ICG) selected repetitive movements based on 50 carload shipments, with a minimum of 30 carloads if 50 carloads did not move. It also indicated that the tonnage selected represented 22.9 percent of its system recyclable traffic, 35.9 percent of carloads originating in the South and approximately 34 percent of virgin traffic. It therefore concludes that the sample size was large enough to make the study results representative.

The St. Louis-San Francisco Railway Company (Frisco)¹¹ in selecting representative movements originating in the South, considered the repetitive nature of the movement, the total number of cars handled, and the mileage of the movements. It also showed

¹¹The St. Louis-San Francisco submitted originating movements in the South and West. To avoid confusion as to what evidence was presented by this carrier for each territory, it will be referred to as the Frisco in the South and the SLSF in the West.

the percentage of tonnage included in its repetitive movements as compared to the total tonnage originated for that commodity.

The Louisville and Nashville Railroad Company (L&N) selected as repetitive those movements which showed at least 20 percent of its traffic for that commodity starting with the heaviest movements until that goal was reached. Overall the shipments selected represent 38 percent of all its recyclable traffic and 58 percent of all virgin traffic originated in 1975. The number of shipments originated by the L&N, the number of different point-to-point movements involved and the number of these included within its unit slips are also given.

The Seaboard Coast Line Railroad Company (SCL) selected repetitive originating movements based on movements consisting of 50 cars or more between one origin and one destination or, if there were no movements totaling 50 cars, then the movements having the greatest number of cars was used.

The 1,338 unit slips presented by the Southern carriers were then analyzed and costed by the SFA.

The WRA devised a standard form to be used by reporting Western roads. A subcommittee chairman was named to coordinate the submission of movements (unit slips are referred to as WRR-1 forms) and other information relating to the particular assigned commodities (information on special equipment, backhauls, and maintenance are contained in the WRR-2 form). If a WRR-2 form was not attached, then it was presumed that there were no special transportation characteristics. Individual roads, generally those thought to have the largest volume movements of the commodities were made members of the committee. The number of carriers submitting movements varied from commodity to commodity.

The western railroads were asked to submit repetitive movements generally based on the following criteria:

- (a) The six largest movements of virgin materials; and
- (b) The two largest movements of recyclable materials in the mileage blocks of 0 to 200 miles, 200 to 400 miles, and over 400 miles.

The reason given for the breakdown into mileage blocks for recyclable commodities is based on the facts that the origins and destinations for recyclables are more diverse and this breakdown would give a more accurate picture of the rates for varying distances.

This criteria was changed for movements on commodities added by the May 12, 1976 order (textile fibers and waste materials, 356 I.C.C.

miscellaneous nonferrous metals, and calcinated bauxite) to four representative or repetitive movements. Two repetitive movements for the commodities contained in the September 1, 1976 order (bags, steel drums, beverage containers, and reclaimed rubber) were also requested.

These unit slips were then consolidated by the subcommittee chairman. If unit slips contained incomplete data, they were supplemented if time permitted; otherwise, they were eliminated. The remaining unit slips were then forwarded to the WRA for costing and analysis. At this stage, duplicate movements were eliminated and faulty unit slips were either rejected or corrected as time permitted. Out of the 963 unit slips presented, 792 were costed by the WRA.

Opposing shippers and governmental participants.—The manner in which the railroads selected so-called "representative or repetitive movements" has been attacked by various shippers, shipper organizations, and the Environmental Protection Agency (EPA). It is argued that respondents have failed to demonstrate the validity and relevance of the movements presented, and have therefore failed to meet their burden of proof.

NARI contends that, except for the southern territory (which did not analyze woodchips), the other territories have failed to demonstrate the validity of their sampling procedures. It is noted that different standards are used in determining "representative" movements for virgin versus recyclable commodities within the same territory, and that the selection of movements between the territories is also varied, ranging from 400 carloads to 1 carload. A different percentage of tonnage moved under the selected movements in comparison to the total tonnage originated for that particular commodity is also criticized.

NARI contends that the invalidity of their sampling is best demonstrated by comparing their samples with the norm presented by the Commission's 1-percent waybill sample. For the carriers' sample to be valid, it is argued that the ratio of carloads of virgin materials should correspond to carloads of recyclable materials as found in the 1-percent waybill sample. This, it is alleged, is not the case as shown from the figure below. Therefore, NARI concludes that the carriers could have in fact, used movements which reflect the most favorable ratio of revenue to variable costs.

TABLE 1

NARI's comparison of ratios of carloads of recyclables virgin products in the 1974 1-percent waybill sample to railroads submissions

	West	South	East
Copper:			
1 percent sample	4.3		
Railroads' sample	152.0		
Lead or zinc:			
1 percent sample	26.1	16.7	62.5
Railroads' sample	216.1	9.9	39.7
Aluminum:			
1 percent sample	10.0	11.5	108.8
Railroads' sample	120.5	10.0	27.1
Paper:			
1 percent sample	31.1	7.1	112.2
Railroads' sample	117.6	3.8	22.7

Conclusion.—The respondents were required by the initial order in this proceeding to "demonstrate the validity of any evidence submitted with respect to the representative or repetitive movements selected."¹² This requirement applies to either representative or repetitive movements and therefore it applies to all submissions of movements offered in this proceeding.

The railroads used varying techniques for determining whether or not a movement was repetitive.¹³ This in and of itself, does not invalidate their selection process. It is common knowledge that certain virgin materials and recyclables move in greater volume than others. A movement of 5 carloads of tin scrap which moves in relatively insignificant amounts, between the same points may be just as representative as the movement of 500 carloads of scrap iron and steel which moves in great volume between the same two points. However each movement is reflective of the rate structure of that particular commodity. Because of the varying amounts of the different commodities transported, it was necessary to allow flexibility in determining a repetitive movement. It is therefore incorrect to argue that the standards of selection should be totally uniform.¹⁴ Where there are different methods of selections used, the

¹²This language appears on page two of the initial order.

¹³All railroads were named respondents to this proceeding. There was no requirement that they jointly submit evidence and hence there was no requirement that each submit evidence based on an identical selection basis.

¹⁴See footnote 13.

carriers have justified the variance, based on such transportation circumstances as the volume of the commodity, the experience of a particular carrier or the desire to present the Commission with rates more reflective of the total rate structure. In some cases, as few as two movement slips are presented yet these movements equalled 25 percent of the carrier's tonnage of that commodity.

We also disagree with NARI's position that the percentage relationship of recyclables to virgin materials in the 1-percent waybill sample should be used to determine the validity of the selected movements. Respondents were not required to make a sample study but had the alternative of presenting information as to repetitive traffic if they could demonstrate its relevance or fairness. Merely because the movements chosen represent differing percentages of traffic than the 1-percent waybill sample, it does not by itself prove any unreasonableness in the movements selected or the manner in which it was done. First, this comparison only indicates whether the percentage relationship between virgin and recyclable commodities is proportionate. Secondly, the respondents should not be penalized for submitting greater carload movements than the 1-percent waybill sample since the additional tonnage increases the likelihood of repetitiveness and representativeness. Thirdly, NARI's presentation fails to recognize that the movements in the sample have not been selected on the basis of being a repetitive movement. And fourthly, the 1-percent waybill is a sample study and the movements presented herein are based on volume movements so that a comparison between the two is of little value.

Although certain opposing parties contend that the respondents have methodically gleaned and selected movements providing the most favorable ratios of revenue to variable cost, there is no probative evidence of record to support this allegation. In fact, as will be shown in later sections on the movements presented for particular commodities, the ratios are varied and often a movement with an extremely high revenue/cost ratio is included despite the fact that it will seriously affect the weighted average of the commodity. This does not indicate that the respondents systematically submitted movements favorable to their position.

In conclusion, we find that the movements submitted by the railroads have been shown to be repetitive movements, the standards for their selection having been adequately justified. The requirement that representative or repetitive movements be submitted, however, was for the purpose of enabling us to determine

the rate structure of a commodity and whether it is just, reasonable or discriminatory.

The railroads have submitted over 3,000 movements, which after the elimination of duplicate movements, intrastate movements, and paper rate movements, still leaves us with 2,125 movements on which to base a decision. In some cases, there may be over 30 movements for a particular commodity originating in a single territory accounting for 30,000 tons annually, which is more than sufficient to portray the rate structure of that commodity. These repetitive movements are therefore an accurate reflection of the traffic which is moving the bulk of the traffic and of the rate structure under investigation.

Where respondents have presented very few movements for a particular commodity, they cannot be heard to complain that the cost ratio evidenced thereby does not reflect the rate structure. Nor can opposing shippers object to the ratios derived from a few movements presented on some commodities since they offered no evidence of additional movements on which we could base a decision.

Paper rates.—In analyzing the unit slips to arrive at the ratio of revenue to variable cost, it was observed that in some instances (1) the estimate of annual tonnage was missing; (2) the minimum weight and actual weight were the same; or (3) there were two or more movements listed between the same points, yet only one movement indicated the estimate of annual tonnage. This shows that no actual movements occurred and the rates in question do not actually move traffic but are so-called "paper" rates. Respondents were asked to submit evidence of representative or repetitive movements. If no traffic moved under these rates, then they are not representative or repetitive and they are of little value in determining the reasonable level of rates on the rate structure. See, *Motor Vehicles from Kansas City to Ark., La., & Tex.*, 318 I.C.C. 301, 315 (1962) and *Ferro Enamel Corp. v. Pennsylvania R. Co.*, 280 I.C.C. 439, 441 (1951). Unit slips showing paper rates have been given no further consideration in this proceeding.

Intrastate rates.—The railroads have in some instances submitted evidence as to intrastate movements. It is contended that the inclusion of these movements will give the Commission a clearer picture of the rate structure of the involved commodities and that the Commission's orders did not exclude information as to intrastate

traffic. The intrastate rates have been updated to include increases authorized in Ex Parte No. 313, although some States had not approved this increase on intrastate rates as of October 11, 1975. Respondents contend that the intrastate rates should be considered at this level however, because generally the States eventually approve the same increase for intrastate traffic as applied on interstate traffic; and it provides for a comparable analysis.

NARI on the other hand argues, (1) that intrastate rates should not be considered in looking at the interstate rate structures over which the Commission has jurisdiction in this proceeding; and (2) that the updating of the rates to the Ex Parte No. 313 level was erroneous for it distorts the analysis of the rate structure. NARI submits that increasing the rates to the Ex Parte No. 313 level will allow the railroads to show a more favorable ratio of revenue to variable costs than actually exists, especially in movements of pulpwood where a number of intrastate rates are submitted.

Conclusion.—Out of the 3,000 movements submitted, nearly 1,000 were intrastate movements. Intrastate rates are not directly regulated by the Interstate Commerce Commission although they may be the subject of §13(4) proceedings, and therefore, the movements in and of themselves, are not necessarily reflective of the interstate rate structure. They will, therefore, not be included in determining the revenue to variable cost ratio, and will not be used in our analysis of the interstate rate structure. If the carriers believe that intrastate rates are unduly low, appropriate relief can be sought under §13(4) of the act.

A. Respondents' cost evidence.

1. **Eastern railroads.**—The eastern railroads developed costs for movements submitted by the member carriers in accordance with the following principles:

- a. The cost should reflect, as specifically as possible the data available from the traffic information.
- b. The most current territorial cost data be used.
- c. Cost applications be as compatible as possible in order to facilitate analysis.

The eastern railroads utilized 1973 regional costs indexed to October 1, 1975 level by a factor of 1.263. The 1973 costs are found in *Rail Carload Cost Scales 1973*, I.C.C. Statement No. 1C1-73, while the update ratio of 1.263 was developed using the procedure set forth in I.C.C. Statement No. 2-58, *Rail Carload Cost Scales by Territories as of January 1, 1958*.

Southern region cost data, introduced by the eastern railroads for interterritorial movements between the East and South are based on 1974 Rail Form A costs developed by the Southern Freight Association. These 1974 costs were indexed to October 1, 1975 by a factor of 1.131.

Western district cost data, introduced by the eastern railroads for interterritorial movements between the East and West, are based on 1974 costs provided by the WRA. These 1974 costs were indexed to October 1, 1975 by a factor of 1.128.

The update factor for each of these regions was developed in accordance with procedures contained in I.C.C. Statement No. 2-58, *supra*.

Sources of information and an explanation of adjustments to the cost follow:

1. Data on type of car, ownership of car, average weight per car, route of movement, and type of rate are from the movement data submitted by the respondent railroads.
2. Tare weights are from table 8 of Statement No. 1C1-73, *supra*, p. 134.
3. Empty-return ratios for the official territory and southern regions were taken from table 14 of Statement No. 1C1-73, *supra*. Empty-return ratios for the western district were taken from a special study in 1974 by the Western Railroad Association.
4. Way-train miles reflect the totals shown on page 4 of Statement No. 1C1-73, *supra*. Where the origin and destination region are different, total way-train miles consist of one-half of the origin region way-train miles and one-half of the destination region way-train miles.
5. Interchange costs have been subtracted from car-mile cost and computed on an actual basis.
6. For multiple-car and trainload shipments, adjustments were made to reflect the appropriate economies. The adjustments employed are the same as suggested by the Coordinator of the February, 4, 1976 decision of Ex Parte 270 (Sub-No. 5), *Investigation of Railroad Frt. Rate Structure*, 345 I.C.C. 548, pages 700-701 and (Sub-No. 6) page 1027. These adjustments are shown in the Commission's comments detailing computation of costs.¹⁵ Eastern railroads stated that these adjustments were made in lieu of special studies due to the time limitation.
7. The distinction as to the type of shipment (single-car, multiple-car, or trainload) is based on the number of cars per shipment, which is included on the movement sheets submitted by the individual railroads. Those movements with 73 cars or greater were treated as trainload shipments, while those movements averaging from 5 to 72 cars per shipment were treated as multiple-car shipments. The use of 73 cars as a cutoff point between multiple-car and trainload movements is based on the average length of a through train of open-hopper cars. It is the opinion of the eastern railroads that any movement of less than five cars should not be considered a multiple-car movement for cost purposes.
8. Because of the nature of iron ore shipments, multiple-car adjustments were made regardless of the type of rate indicated, while for all other commodities, the adjustment was made only if a multiple-car or trainload rate was indicated and the

¹⁵See page 135.

356 I.C.C.

average number of cars fell within the ranges indicated above. The lack of adjustment for commodities other than iron ore is due to the fact that cars per shipment represent average cars per day moving between two cities, without any assurance of multiple switch handling at a single location within that city.

The verified statement of witnesses Curran, Adell, Becker, Weber and Nappi contains the results, i.e., revenue-to-variable-cost comparisons, for the selected repetitive movements submitted by the various eastern carriers. The results for each movement are shown and the weighted average ratio for each commodity (STCC) is shown. However, a comparison of the results for recyclables with its competing or potentially competitive virgin commodity has not been performed.

Southern Freight Association (SFA).—The cost evidence for the SFA, consists of costs and revenue-cost comparisons for individual "unit slips" which were prepared by the major southern railroad systems and one western road which has substantial operations in the southern region (St. Louis-San Francisco Railway). Such unit slips contain the basic information necessary for costing rail movements, i.e., STCC, origin, destination, average weight per car, car type, and route of movement.

For all movements, except those in shipper-owned tank cars, a computer program was used to develop costs, using the information contained on the unit slips plus supplemental information supplied by SFA. This included way-train miles, thru-train miles, origin and destination terminal handlings, and number of interchanges by region.

Southern unit costs employed in the cost program were the same as those used in the submissions of the Western and Eastern roads for the Southern portion of the interterritorial movements, e.g., South to East, South to West. Eastern and western costs were provided to SFA by the eastern railroads and WRA respectively. Southern unit costs are based on an application of Rail Form A to the expenses and statistics of Southern carriers. This application was performed by SFA. SFA states that the updating index factors for the Southern region costs were developed in accordance with procedures set forth in I.C.C. Statement No. 2-58, *supra*. SFA does not indicate how the update factors for the official and western costs were developed. The update procedures used for the East and West are discussed in their respective section with each stating that procedures contained in I.C.C. Statement No. 2-58 were utilized.

SFA's costing procedure.—SFA states that they followed the generally accepted costing techniques in developing both variable and fully allocated costs on a carload basis.

While movements in tank cars, which approximated only 1 percent of the total movements, were not costed using SFA's computer program, they were costed out manually.

Revenue.—The revenues shown for each movement reflect rates effective on interstate traffic as of October 11, 1975, which is the Ex Parte No. 313 level.

Western Railroad Association (WRA).—WRA follows the same general costing approach for all the study movements. These procedures follow the format adopted by the Commission in Ex Parte 270 (Sub-Nos. 5 and 6), including the suggested adjustments for multiple-car and trainload movements. WRA's cost computations are based on the following characteristics.

1. No consideration is given to loss and damage.
2. The adjustments for multiple-car and trainload movements previously noted, were made to variable costs only.
3. Fully allocated costs were distributed on a ton and ton-mile basis.
4. Although specific operating conditions and characteristics were submitted by member railroads for some of the commodities under study, such adjustments were not made due to time constraints.

Unit costs were developed for the western railroads by applying Rail Form A to 1974 operations of western district carriers. This application was performed by WRA. Unit costs for the official territory were taken from I.C.C. Statement No. 1C1-73, *supra*. The unit costs for all three regions were updated using the procedure outlined in I.C.C. Statement No. 2-58, *supra*. For the southern and eastern portions of interterritorial movements, WRA utilized unit costs provided by SFA and the eastern railroads respectively.

Terminal costs were applied equally to the origin and destination carriers. Line-haul costs were applied according to the miles of movement in each region, based on actual miles. Way-train miles were applied, where applicable, to the origin and destination carriers. Way miles, tare weight, and empty return ratios were taken from I.C.C. Statement No. 1C1-73 *supra*.

Although 963 specific movements were submitted by the member carriers, insufficient information, commodities not subject to this investigation, and duplications reduced to 792, the number of movements which were actually costed out by WRA.

No weighted average ratio for each commodity is shown by WRA for the western territory's movements. WRA states that it intended to present weighted averages but due to the lack of time and data, 356 I.C.C.

weighted average results were not shown. Thus, WRA provides results only on an individual movement basis.

In a subsequent statement, WRA submitted revenue-cost comparisons for 61 additional movements. Of these movements, 8 were eliminated due to insufficient information, resulting in 53 additional movements or a total of 845 (792 plus 53).

Shipper comments.

1. American Paper Institute (API) assails the weaknesses found in using Rail Form A costs and territorial averages in analyzing specific movements. Among the deficiencies noted by API are:

- a. The use of territorial averages does not reflect the cost characteristics particular to an individual movement.
- b. Rail Form A ignores the differences in the many and varied types of facilities in deriving its terminal costs, such as reduced congestion, at facilities located in rural areas.
- c. Main-line and branch-line costs are combined to arrive at aggregate costs. Such aggregate costs represent neither type of operation.
- d. Operating factors should be based on special studies. Lacking such studies, factors are often based on arbitrary judgment or on studies performed many years ago which do not reflect the technological changes in the industry over time.
- e. Lack of explicit unit costs can result in either overstatement or understatement of costs, as the many specific operating characteristics are not reflected.
- f. The fact that maintenance is deferred and such maintenance is not included in Rail Form A costs, means that maintenance expenses, as reported, are understated, especially in the official territory. Also, expenses such as labor and locomotive costs are overstated, due to the incidence of restricted speed operations as well as increased terminal congestion.
- g. Territorial applications of Rail Form A do not reflect economies realized from handling cars in groups or in through movement.
- h. Territorial applications of Rail Form A reflect average intermediate switching and average movement in way-trains. The probability that such averages will reflect those characteristics of a particular traffic is small.
- i. Rail Form A does not reflect variations in the utilization of capacity. For example, train crew and other train-related expenses, taken as 97 percent variable with train-miles, are allocated to traffic in proportion to gross ton-miles, based on the average weights of way and through trains. Such trains could handle added traffic with little or no increase in cost, and would likewise experience little reduction in cost for a decrease in traffic.

In developing variability percentages for use in Rail Form A, correlation coefficients as low as 24 percent were found after an inspection of the working papers. This would indicate that only 24 percent of the variation in cost is explained by the independent variable.

There is no logical reason to compute fully allocated costs; as the railroads have done, and as the Commission has done in its Burden Study. Any traffic which generates revenue in excess of variable cost is making a contribution to covering constant cost plus profit. Thus, a railroad is better off with this traffic than without it.

While Rail Form A costs require substantial adjustments to reflect the characteristics of any specific traffic, even after all feasible adjustments are made, such costs are still open to question.

2. EPA asserts that the respondent railroads have not met the burden of proof in this proceeding. Specifically:

- a. The cost applications of the railroad submissions are not comparable.
- b. The cost studies presented by the railroads do not reflect the peculiar transportation characteristics of the study commodities. Such characteristics would include special equipment or handling.

Commission's discussions and conclusions.

1. *Discussion relative to respondents' cost evidence.*—With regard to respondents' cost evidence, the following comments apply:

- a. The general methodology for computation of costs and for updating costs to the October 1975 level are the same employed in the Ex Parte No. 270 investigations and acceptable for investigations that are this large and this general.
- b. Eastern railroad's use of 73 cars as the minimum number of cars for consideration of the movement as a trainload movement is acceptable in this proceeding as this is based on actual operating experience. In the absence of such known data in Ex Parte No. 270, the Commission utilized a figure of 50 cars.
- c. Eastern railroads' consideration of all movements of iron ore as trainload movements is justifiable only to the extent that the evidence of record indicates that such movements have the minimum number of cars to be considered trainload movements.
- d. Eastern railroads' determination of the type of movement (single-car, multiple-car, or trainload) based solely on the type of rate is improper for cost purposes. Basing the type of movement on the rate ignores the operating characteristics of the traffic. For example, if 10 cars make up a shipment, but the shipment moves under a single-car rate, this movement would, nevertheless, produce the economies and cost savings for the railroad inherent in multi-car movements. Costs should reflect, to the extent possible, the actual operation.
- e. SFA fails to recognize the economies and cost savings associated with multiple-car and trainload movements. SFA's failure to make adjustments for such movements results in a cost overstatement and subsequent understatement of the ratio of revenue-to-variable cost.
- f. Western railroads show only the results for individual movements. The failure to show results on a commodity basis is a serious shortcoming of western railroads' cost presentation.

g. All respondents failed to show comparisons of results for recyclable commodities with their competing or potentially competitive virgin commodities.

h. Western railroads' failure to include loss and damage in its costs results in an understatement of costs.

Discussion relative to shipper comments.—

A. *API's comments.*—API cites weaknesses found in Rail Form A costs and in the use of territorial average costs. With regard to API's specific comments as previously stated, the following comments apply:

1. While the use of unadjusted territorial average costs does not reflect costs peculiar to an individual movement or include costs to reflect specific operating factors, Rail Form A does retain the flexibility to make adjustments where significant deviations from the average occur.

Thus, in the absence of more specific information, the use of territorial average costs is acceptable. If operating factors, such as those cited by API movement in way-trains, multiple-car groupings, and switching differ from the territorial average, adjustments to the territorial average costs can be made. This minimizes any under or overestimation of costs.

2. API cites the fact that deferred maintenance is not included in Rail Form A costs and understates maintenance expense as reported by the carriers. While recognizing that maintenance may be deferred, it has nonetheless not been incurred and is not properly includible in the cost of service at this time.

This, however, is not a shortcoming of Rail Form A, but rather a problem resulting from the fact that deferred maintenance is difficult to quantify with any degree of precision, and lends itself to subjective determination based on arbitrary judgments. Even if deferred maintenance could be properly determined there is still the question of whether it is properly includible as costs or perhaps as an independent rate consideration.

3. While Rail Form A does not distinguish explicitly between main-line and branch-line costs, as API asserts, these costs are embodied in the costs for the two types of line-haul service; way-train and through train service.

4. API asserts that operating factors should be based on special studies. Special studies are preferable. However in the absence of them, and in investigations as broad as this, determinations may be made on evidence lacking such specificity.

5. API alleges that there is a coefficient of correlation of only 24 percent shown in the Commission workpapers underlying the variability study. This allegation of a coefficient of correlation of 24 percent appears to be the result of a misinterpretation of the coefficient of determination (R^2) given in staff workpapers. Apparently, this statistic was considered to be the coefficient of correlation (r). Although irrelevant to this proceeding, further inspection of these workpapers indicate that this relatively low coefficient of determination is an exception. The variability ratios used in Rail Form A are the best known approximations available for separating expenses between their variable and constant components.

6. API criticizes the introduction of fully allocated costs in this proceeding. The comparison of revenue and variable costs, states API, is the only consideration of worth, since any rate which exceeds variable cost makes a contribution to overhead and profit.

While the Commission uses the ratio of revenue-to-variable cost as the basic unit of comparison between rates on virgin and

356 I.C.C.

There is no logical reason to compute fully allocated costs; as the railroads have done, and as the Commission has done in its Burden Study. Any traffic which generates revenue in excess of variable cost is making a contribution to covering constant cost plus profit. Thus, a railroad is better off with this traffic than without it.

While Rail Form A costs require substantial adjustments to reflect the characteristics of any specific traffic, even after all feasible adjustments are made, such costs are still open to question.

2. EPA asserts that the respondent railroads have not met the burden of proof in this proceeding.

Specifically:

a. The cost applications of the railroad submissions are not comparable.

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a. The general methodology for computation of costs and for updating costs to the October 1975 level are the same employed in the Ex Parte No. 270 investigations and acceptable for investigations that are this large and this general.

b. Eastern railroad's use of 73 cars as the minimum number of cars for consideration of the movement as a trainload movement is acceptable in this proceeding as this is based on actual operating experience. In the absence of such known data in Ex Parte No. 270, the Commission utilized a figure of 50 cars.

c. Eastern railroads' consideration of all movements of iron ore as trainload movements is justifiable only to the extent that the evidence of record indicates that such movements have the minimum number of cars to be considered trainload movements.

d. Eastern railroads' determination of the type of movement (single-car, multiple-car, or trainload) based solely on the type of rate is improper for cost purposes. Basing the type of movement on the rate ignores the operating characteristics of the traffic. For example, if 10 cars make up a shipment, but the shipment moves under a single-car rate, this movement would, nevertheless, produce the economies and cost savings for the railroad inherent in multi-car movements. Costs should reflect, to the extent possible, the actual operation.

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356 I.C.C.

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Discussion relative to shipper comments.—

A. *API's comments.*—API cites weaknesses found in Rail Form A costs and in the use of territorial average costs. With regard to API's specific comments as previously stated, the following comments apply:

1. While the use of unadjusted territorial average costs does not reflect costs peculiar to an individual movement or include costs to reflect specific operating factors, Rail Form A does retain the flexibility to make adjustments where significant deviations from the average occur.

Thus, in the absence of more specific information, the use of territorial average costs is acceptable. If operating factors, such as those cited by API movement in way-trains, multiple-car groupings, and switching differ from the territorial average, adjustments to the territorial average costs can be made. This minimizes any under or overestimation of costs.

2. API cites the fact that deferred maintenance is not included in Rail Form A costs and understates maintenance expense as reported by the carriers. While recognizing that maintenance may be deferred, it has nonetheless not been incurred and is not properly includible in the cost of service at this time.

This, however, is not a shortcoming of Rail Form A, but rather a problem resulting from the fact that deferred maintenance is difficult to quantify with any degree of precision, and lends itself to subjective determination based on arbitrary judgments. Even if deferred maintenance could be properly determined there is still the question of whether it is properly includible as costs or perhaps as an independent rate consideration.

3. While Rail Form A does not distinguish explicitly between main-line and branch-line costs, as API asserts, these costs are embodied in the costs for the two types of line-haul service; way-train and through train service.

4. API asserts that operating factors should be based on special studies. Special studies are preferable. However in the absence of them, and in investigations as broad as this, determinations may be made on evidence lacking such specificity.

5. API alleges that there is a coefficient of correlation of only 24 percent shown in the Commission workpapers underlying the variability study. This allegation of a coefficient of correlation of 24 percent appears to be the result of a misinterpretation of the coefficient of determination (R^2) given in staff workpapers. Apparently, this statistic was considered to be the coefficient of correlation (r). Although irrelevant to this proceeding, further inspection of these workpapers indicate that this relatively low coefficient of determination is an exception. The variability ratios used in Rail Form A are the best known approximations available for separating expenses between their variable and constant components.

6. API criticizes the introduction of fully allocated costs in this proceeding. The comparison of revenue and variable costs, states API, is the only consideration of worth, since any rate which exceeds variable cost makes a contribution to overhead and profit.

While the Commission uses the ratio of revenue-to-variable cost as the basic unit of comparison between rates on virgin and

recyclable commodities in this proceeding, the computation of revenue to fully allocated cost ratios is not meaningless or illogical as API implies. Fully allocated costs represent those costs which must be covered if the firm is to remain viable. Thus, while the ratios of revenue to fully allocated costs are provided for information in this proceeding, such ratios are not meaningless, as API implies.

B. *EPA's comments.*—EPA criticizes respondents' presentation for not being comparable and not reflecting special operating characteristics of the commodities under study.

With regard to the presentation of results, respondents have essentially complied with the outline for the presentation of evidence as contained in the order instituting this investigation and, therefore, have met the minimum requirements of this proceeding. This is particularly true for the submissions of the western railroads. The incomplete data submitted, the inclusion of duplicate movements and paper rates, and the presentation of results only for individual movements, is less than a superlative effort.

The railroads contend that their failure to take special factors into consideration was caused by the magnitude of this investigation and the limited amount of time in which respondents had to prepare their submissions.

Commission's analysis of cost evidence.

General cost methodology.—The Commission has computed ratios of revenue-to-variable cost for the movements submitted by respondents. This ratio was computed by dividing the revenue per ton by the variable cost per ton.

The revenue per ton was taken from the movement data submitted by respondents.

In addition to the variable costs computations, fully allocated costs are developed for these movements with constant costs distributed on three basis, i.e., ton and ton-mile, car and car-mile, and dollar basis. As noted, the cost estimates provided are for the representative movements of record with the exception of the so-called "paper rates." Also, no cost estimates are provided in those instances where sufficient information was not available to prepare the necessary data.

These cost estimates utilized regional average costs adjusted to reflect operating practices as described below. These adjusted regional average costs, which are stated in dollars per net ton are at

the October 1975 level of costs, are compared with the rate per net ton which reflect the Ex Parte No. 313 rate level.

The variable and fully allocated costs are based on the unit costs shown in *Rail Carload Cost Scales by Territories for the Year 1974*, Statement No. 1C1-74, prepared by the Commission's Cost and Valuation Section. In addition, the costs in these tables reflect an updating to an October 1975 level based on the methods outlined in *Rail Carload Costs Scales by Territories as of January 1, 1958*, Statement No. 2-58.

Variable costs consist of: (1) the variable portions of freight operating expenses, rents and taxes (excluding Federal income taxes), and (2) the variable portion of the "cost of capital", excluding any allowance for Federal income taxes. Fully allocated costs consist of the variable costs plus an allocation of the constant costs which are composed of: (1) the constant portions of the freight operating expenses, rents and taxes (excluding Federal income taxes), and (2) the constant, or remaining, portion of the "cost of capital."

When developing the fully allocated cost for a given movement, the variable cost (ultimately stated in cents per net ton for a comparison to the rate) is developed first and to this cost there is added an allocation of the constant costs. For comparison purposes fully allocated costs are shown on three bases, with constant costs being allocated on the ton and ton-mile basis, the car and car-mile basis, and the dollar basis. To develop the constant unit costs per ton and per ton-mile, and the constant unit costs per car and per car-mile, the dollar numerators, separated between those expenses and cost of capital not associated with distance (terminal) and those expenses and cost of capital associated with distances (line-haul), remain the same. However, the divisors change, that is, for the ton and ton-mile basis the tons originated and terminated, and the ton-miles were used for the respective terminal and line-haul elements, and, for the car and car-mile basis the loaded cars and the loaded car-miles were used in a similar way. The constant unit costs for each of the two bases were then applied to the respective tons and ton-miles, and cars and car-miles, generated by a particular movement. The allocated constant costs thus obtained for each basis is converted to constant cost per net ton, which were then added to the variable cost per net ton to produce the fully allocated costs per net ton for each basis. For the dollar basis an allocation ratio was developed for each region by dividing regional total costs (variable

plus constant) by that region's total variable costs. The variable cost per net ton for a given movement was then multiplied by the applicable regional ratio to produce the fully allocated cost per net ton.

In this proceeding the basic unit of analysis and comparison is the ratio of revenue-to-variable cost. The ratios of revenue-to-fully allocated cost for each of the three methods discussed above are provided for information and will not be the subject of further discussion.

The variable and fully allocated costs shown were computed based on a computerized cost program developed by the Commission's Section of Cost and Valuation. The cost program permits cost determinations for a voluminous number of rail shipments having specific transportation characteristics. In this proceeding the railroads have supplied the Commission with revenue and traffic data for specific commodity movements.

Essentially this cost program applies the various Rail Form A service unit costs to the actual kinds and amounts of services being performed by the railroads in moving specific commodities from origin to destination. Furthermore, to facilitate a more detailed analysis it arrays and groups a multitude of various revenue and cost data into easily understood tables. We have found, however, that time does not permit the detailed analysis that we anticipated.

Adjustments to costs.—The variable costs reflect adjustments to territorial average costs to recognize certain transportation characteristics indicated in the exhibits of record, including the actual route of movement miles, actual or average actual lading weights, and car ownership, whether privately owned or railroad owned. Where the car was other than carrier owned, the ownership costs were removed from variable and fully allocated costs. Costs for each movement were based on the specific type of car used.

In addition, where the actual routing of the movement was shown, line-haul costs were adjusted by removing the interchange costs included in the territorial average costs on a loaded car-mile basis and substituting therefor the interchange cost per car interchanged using the actual number of interchanges from the routings shown in the exhibits of record.

In addition, adjustments were made for movements which involved multiple-car or trainload movements. If a movement had 5 cars or more up to a total of 49, it was considered to be a multiple-car movement and costed as such. Although we stated previously herein that the eastern railroads' use of a 73 car standard for

trainload movements was reasonable, data required to verify this figure were not available. In addition, actual figures such as those shown for the eastern district were not available for the South and/or the West. With this in mind we again as in Ex Parte No. 270, used a figure of 50 cars as a standard for trainload movements in all regions. This determination was based on the average number of cars per movement, not the rate. Thus, a shipment may have moved under single-car rates, but if the evidence of record indicated an average number of cars per movement of five or more, it was costed out as a multiple-car movement.

More specifically, the adjustments for multiple-car and trainload movements are as follows:

For *multiple-car movements*, terminal costs were adjusted by reducing the switching cost per carload by 50 percent at origin and destination, by reducing variable freight train car costs per carload by 50 percent at origin and destination, and by reducing station clerical costs per carload by assuming 75 percent of the cost as being associated with the car and 25 percent as being associated with the shipment. Line-haul costs were adjusted by removing the interchange costs included in the territorial average costs on a loaded car-mile basis and substituting therefor the interchange costs per car interchanged and using the number of interchanges from the routings shown in the exhibits of record.

For *trainload movements*, terminal costs were adjusted by reducing the switching cost per carload by 75 percent at origin and destination, by reducing variable freight train costs per carload by 50 percent at origin and destination, and by reducing station clerical costs per carload by assuming 75 percent of the cost as being associated with the car and 25 percent as being associated with the shipment. Line-haul costs were adjusted by removing the interchange costs included in the territorial average cost on a loaded car-mile basis and substituting therefor the interchange cost per car interchanged (reduced by 50 percent) and using the number of interchanges from the routings shown in exhibits of record. Further, the territorial average inter-intra train switching cost per loaded car-mile was eliminated.

In summary, we have arrived at revenue-to-cost ratios using methodologies similar to that employed by the respondent railroads. Our adjustments reflect, among other things, the more favorable operating characteristics for multiple-car movements in the South and East, loss and damage in the West, and a more accurate determination of trainload movements of iron ore in the East.

C. Display of commission's results.—To facilitate a better understanding of the revenue and cost data, 6 tables displaying the cost results have been developed:

1. The number and percent of movement where the revenue-to-cost ratios fall below variable and/or fully allocated costs, i.e., ratios less than 100 percent (Table 1.)

2. A frequency distribution showing the number of revenue-to-cost ratios falling in percentage blocks ranging from below 95 percent to 230 percent and over. In addition, the simple average ratios of revenue-to-variable cost and revenue-to-fully allocated cost are shown. (Table 2.)

3. The range of ratios computed for a commodity group, i.e., the lowest ratio of revenue-to-variable cost and the highest ratio as well as the simple average ratio. (Table 3.)

4. A frequency distribution showing the number of movements by weight bracket and the simple average ratio of revenue-to-variable cost for each bracket. (Table 4.)

5. A frequency distribution showing the number of movements by mileage blocks and the simple average ratio of revenue-to-variable cost for each mileage block. (Table 5.)

6. The weighted average ratio of revenue-to-variable cost for each commodity by region. (Table 7¹⁶). (The key figures in this investigation.)

Because of the voluminous nature of these tables, and in view of the statutory time constraints, the tables will be placed in the official docket rather than appended to the report.

Additional comments.

1. In the discussion for the various commodity groups the following clarifying comments apply:

a. The respondent railroads' results reflect the weighted average ratio for the East and South and the simple average ratio for the West, as the western railroads present no summaries, only individual movement results.

b. The Commission's results are based on interstate movements only.

c. The inclusion of a movement in a territory is based on the origin territory.

d. Because the submission of the Western railroads contains movements which originated on southern or eastern railroads, in some instances the Commission's results for a given commodity include ratios for more movements than shown in respondents' results.

e. In this proceeding the terms "revenue-to-variable cost" and "rate-to-variable cost" used in the comments and tables are used synonymously.

f. Due to differences in the method of computation and due to rounding, the simple average ratio of revenue-to-variable cost shown in the Commission's display of results may vary by one percentage point.

2. With regard to the Commission's revenue-cost computations the following comments apply:

¹⁶No table 6 was developed.

- a. To the maximum extent possible duplications and paper rates were deleted.
- b. The weighted average ratio of revenue-to-variable cost is based on the estimate of annual tonnage for the year 1975 shown in the submissions of the respondent railroads. The estimates were rounded off to the nearest 1,000 tons with the exception of low annual tonnages (under 1,000 tons), which were rounded to either 500 tons or 1,000 tons. With respect to many movements in the West, estimates of annual tonnage were not submitted, for those movements we assigned a minimum figure of 500 tons.
- c. Where traffic originated, terminated, or received intermediate handling on a Canadian railroad, the costs applied were those of the cost region closest geographically to the movement on the Canadian railroad. For example, to a movement terminating in Vancouver, British Columbia, region VI costs were applied as this is the cost region closest in proximity to that part of Canada. This represents the best approximation in the absence of costs for Canadian rail service.
- d. Data for movements of beverage containers, returned empty (STCC No. 42 111 42) indicates the use of railroad-owned refrigerator cars. Closer examination reveals that the type of car would be a boxcar general service equipped. This car type was used where the mechanical designation for the car type (R-103) in the data of record indicates the use of a damage-free car with railroad ownership.

PART II

HISTORICAL EVIDENCE ON UTILIZATION OF RECYCLABLE MATERIALS

The railroads also submitted evidence on the use of recyclable and virgin material and their prices when known. The percentage increase in rates caused by general rate increases and in many instances the percentage of the freight cost to the price of the commodity was also shown. Comparing this data, the railroads reached the conclusion that there was no correlation between the amount of traffic transported and general rate increases. Instead, the movement of scrap is generally determined by the level of activity in the consuming industry, for example, the automobile industry. This, it is argued, supports their position that rates have not affected the movement of the involved commodities. A more complete analysis of the impact of rate increases and the effect of rates on the movement of traffic is presented by the Gellman Research Associates, Inc., on behalf of all railroad respondents, in part III.

Opposing shippers.—The various scrap dealers and organizations contend that the respondents are in error in arguing that rates have no significant effect on the movement of recyclables. It is alleged that in many instances, general rate increases have limited the market in which recyclable materials can be sold or procured and caused scrap dealers to either discontinue selling to a certain customer or to divert the traffic to private or for-hire motor carriers.

356 I.C.C.

The alleged sensitivity of the movement of recyclables to changes in rates, is based on a number of factors. First, a scrap dealer may be operating at a very low margin of profit and can ill-afford increased costs. Secondly, in many instances, the scrap dealer pays two transportation charges: the inbound charge to its scrap yard and the outbound charge to the smelter or mill. Thirdly, the transportation rate compared to the generally low value of the certain recyclables shown means that transportation costs are a major component of the selling price.

Evidence is presented on the mechanics of the recycling industry, the consumption and processing of scrap, and the effect of rate increases on the movement of traffic. It is argued that the railroads have aggravated the unreasonable and distorted rate base structure of recyclables by the various general rate increases.

NARI argues that freight rates on recyclables distorted by successive general increases have been a major factor in:

- (1) Causing existing markets for many recyclable commodities to be lost;
- (2) Causing potential markets for recyclables to be economically unattainable, thereby thwarting new capital investments in recycling facilities;
- (3) Causing the range from which solid waste materials can be recovered and marketed to be narrowed;
- (4) Causing producers and users of recyclable solid waste materials to curtail or terminate their business activities;
- (5) Causing recycling levels in practically all commodities to fall and lose competitive positions with competing virgin materials;
- (6) Causing the economics of recycling to be highly cyclical, by compounding costs of resource recovery to a point at which many commodities are "costed out" of the marketplace in all but boom periods;
- (7) Causing the overwhelming proportion of new research and development in product applications to be devoted to the use of virgin materials in view of their increased attractiveness from a competitive standpoint;
- (8) Causing integrated companies with domestic and foreign sources of virgin supply to intensify their mining exploitations and tree harvesting activities and acquisitions in view of the more competitive attractiveness of virgin materials; and
- (9) Causing large users of raw materials to abandon or ignore the national call for a recycling ethic in favor of continued dependence on virgin materials, both from domestic and overseas sources.

356 I.C.C.

If the rail rates are reduced, it is argued, that the movement of recyclable commodities will be encouraged. NARI contends that if the discriminatory and unreasonable rate structure is eliminated, the following percentage increases in the recycling of certain commodities will result: (1) 80-percent to 100-percent increase in waste paper; (2) 100-percent increase in aluminum; and (3) 30-percent to 40-percent increase in copper, lead, and zinc.

Governmental participants.—The EPA alleges that the carriers generally have failed to submit data under this part and have instead, merely made unsubstantiated assertions that rail rates have no effect on the movement of the involved traffic.

Rebuttal.—Gellman Research Associates, Inc. (Gellman), on behalf of respondents, argues that NARI is incorrect in alleging that the disparity in rates between recyclables and virgin commodities has increased. Some adjustment should be made in the comparison to take account for the effect of inflation on changes in railroad rates. Using NARI's data (tables 2-4 below), it is shown that scrap rates, relative to virgin rates, are less expensive today than they were in 1959, and therefore, the relative rate disparity between scrap and virgin rates had declined. It is also pointed out that except for paper in the southern territory, scrap rates have increased at a slower rate than those for virgin commodities. Rail rate changes for scraps since 1959 are thereby concluded to have been more favorable than changes for virgin commodities.

TABLE 2

Relative railroad rates for scrap versus virgin commodities: 1959-1975

Commodity	(SCRAP RATES)			(VIRGIN RATES)		
	Ex Parte No. 223			Ex Parte No. 313		
	(¹)	(²)	(³)	(¹)	(²)	(³)
Paper.....	1.917	1.734	1.963	1.662	1.663	2.000
Aluminum.....	1.640	1.709	1.968	1.443	1.692	1.926
Copper.....		1.517	1.273		1.409	1.132
Zinc.....	1.297	1.442	1.542	1.162	1.271	1.363
Lead.....		3.600			3.120	

¹ Eastern territory

² Western territory

³ Southern territory

⁴ Ex Parte 256

Source: Reply testimony of John C. Vaccaro.

TABLE 3

Percentage change in relative rates for scrap versus virgin commodities: 1959-1975

Commodity	Eastern territory	Western territory	Southern territory
Paper.....	-13.3	-4.1	+1.9
Aluminum.....	-12.0	-1.0	+2.1
Copper.....		-7.1	-11.1
Zinc.....	-10.4	-10.6	-11.6
Lead.....		-13.3	

¹ Comparison made between Ex Parte No. 256 and Ex Parte No. 313 rates.

Source: Reply testimony of John C. Vaccaro.

TABLE 4

Indexes of absolute and inflation adjusted changes in railroad rates for scrap and virgin commodities 1959-1975

Commodities	Index of absolute change in rates (1959-1975)			Index of change in rates adjusted for inflation (1959-1975) (1957-59 dollars)		
	(¹)	(²)	(³)	(¹)	(²)	(³)
Paper waste.....	182.8	197.4	181.1	97.5	105.3	96.6
Pulpwood.....	210.9	205.9	177.8	112.5	109.8	94.8
Aluminum scrap and dross.....	186.6	195.1	169.1	99.5	104.1	90.2
Bauxite ore, alumina, calcined.....	212.0	193.0	171.4	113.1	119.7	106.3
Copper scrap.....		183.7	183.3		113.8	97.7
Copper ore and concentrate.....		197.8	206.1		122.9	109.9
Zinc scrap and dross.....	190.4	184.1	187.8	101.5	98.2	100.2
Zinc ore and concentrate.....	212.5	205.9	212.5	113.3	109.8	113.3
Lead scrap.....		185.7			99.0	
Lead concentrate.....		214.3			114.3	

¹ Eastern territory

² Western territory

³ Southern territory

⁴ Comparison for 1967-1975

Source: Reply testimony of John C. Vaccaro.

Handbook of Labor Statistics 1976, U.S. Dept. of Labor, Washington, D.C.

weighted average results were not shown. Thus, WRA provides results only on an individual movement basis.

In a subsequent statement, WRA submitted revenue-cost comparisons for 61 additional movements. Of these movements, 8 were eliminated due to insufficient information, resulting in 53 additional movements or a total of 845 (792 plus 53).

Shipper comments.

1. American Paper Institute (API) assails the weaknesses found in using Rail Form A costs and territorial averages in analyzing specific movements. Among the deficiencies noted by API are:

- a. The use of territorial averages does not reflect the cost characteristics particular to an individual movement.
- b. Rail Form A ignores the differences in the many and varied types of facilities in deriving its terminal costs, such as reduced congestion, at facilities located in rural areas.
- c. Main-line and branch-line costs are combined to arrive at aggregate costs. Such aggregate costs represent neither type of operation.
- d. Operating factors should be based on special studies. Lacking such studies, factors are often based on arbitrary judgment or on studies performed many years ago which do not reflect the technological changes in the industry over time.
- e. Lack of explicit unit costs can result in either overstatement or understatement of costs, as the many specific operating characteristics are not reflected.
- f. The fact that maintenance is deferred and such maintenance is not included in Rail Form A costs, means that maintenance expenses, as reported, are understated, especially in the official territory. Also, expenses such as labor and locomotive costs are overstated, due to the incidence of restricted speed operations as well as increased terminal congestion.
- g. Territorial applications of Rail Form A do not reflect economies realized from handling cars in groups or in through movement.
- h. Territorial applications of Rail Form A reflect average intermediate switching and average movement in way-trains. The probability that such averages will reflect those characteristics of a particular traffic is small.
- i. Rail Form A does not reflect variations in the utilization of capacity. For example, train crew and other train-related expenses, taken as 97 percent variable with train-miles, are allocated to traffic in proportion to gross ton-miles, based on the average weights of way and through trains. Such trains could handle added traffic with little or no increase in cost, and would likewise experience little reduction in cost for a decrease in traffic.

In developing variability percentages for use in Rail Form A, correlation coefficients as low as 24 percent were found after an inspection of the working papers. This would indicate that only 24 percent of the variation in cost is explained by the independent variable.

There is no logical reason to compute fully allocated costs; as the railroads have done, and as the Commission has done in its Burden Study. Any traffic which generates revenue in excess of variable cost is making a contribution to covering constant cost plus profit. Thus, a railroad is better off with this traffic than without it.

While Rail Form A costs require substantial adjustments to reflect the characteristics of any specific traffic, even after all feasible adjustments are made, such costs are still open to question.

2. EPA asserts that the respondent railroads have not met the burden of proof in this proceeding. Specifically:

- a. The cost applications of the railroad submissions are not comparable.
- b. The cost studies presented by the railroads do not reflect the peculiar transportation characteristics of the study commodities. Such characteristics would include special equipment or handling.

Commission's discussions and conclusions.

1. *Discussion relative to respondents' cost evidence.*—With regard to respondents' cost evidence, the following comments apply:

- a. The general methodology for computation of costs and for updating costs to the October 1975 level are the same employed in the Ex Parte No. 270 investigations and acceptable for investigations that are this large and this general.
- b. Eastern railroad's use of 73 cars as the minimum number of cars for consideration of the movement as a trainload movement is acceptable in this proceeding as this is based on actual operating experience. In the absence of such known data in Ex Parte No. 270, the Commission utilized a figure of 50 cars.
- c. Eastern railroads' consideration of all movements of iron ore as trainload movements is justifiable only to the extent that the evidence of record indicates that such movements have the minimum number of cars to be considered trainload movements.
- d. Eastern railroads' determination of the type of movement (single-car, multiple-car, or trainload) based solely on the type of rate is improper for cost purposes. Basing the type of movement on the rate ignores the operating characteristics of the traffic. For example, if 10 cars make up a shipment, but the shipment moves under a single-car rate, this movement would, nevertheless, produce the economies and cost savings for the railroad inherent in multi-car movements. Costs should reflect, to the extent possible, the actual operation.
- e. SFA fails to recognize the economies and cost savings associated with multiple-car and trainload movements. SFA's failure to make adjustments for such movements results in a cost overstatement and subsequent understatement of the ratio of revenue-to-variable cost.
- f. Western railroads show only the results for individual movements. The failure to show results on a commodity basis is a serious shortcoming of western railroads' cost presentation.

g. All respondents failed to show comparisons of results for recyclable commodities with their competing or potentially competitive virgin commodities.

h. Western railroads' failure to include loss and damage in its costs results in an understatement of costs.

Discussion relative to shipper comments.—

A. API's comments.—API cites weaknesses found in Rail Form A costs and in the use of territorial average costs. With regard to API's specific comments as previously stated, the following comments apply:

1. While the use of unadjusted territorial average costs does not reflect costs peculiar to an individual movement or include costs to reflect specific operating factors, Rail Form A does retain the flexibility to make adjustments where significant deviations from the average occur.

Thus, in the absence of more specific information, the use of territorial average costs is acceptable. If operating factors, such as those cited by API movement in way-trains, multiple-car groupings, and switching differ from the territorial average, adjustments to the territorial average costs can be made. This minimizes any under or overestimation of costs.

2. API cites the fact that deferred maintenance is not included in Rail Form A costs and understates maintenance expense as reported by the carriers. While recognizing that maintenance may be deferred, it has nonetheless not been incurred and is not properly includible in the cost of service at this time.

This, however, is not a shortcoming of Rail Form A, but rather a problem resulting from the fact that deferred maintenance is difficult to quantify with any degree of precision, and lends itself to subjective determination based on arbitrary judgments. Even if deferred maintenance could be properly determined there is still the question of whether it is properly includible as costs or perhaps as an independent rate consideration.

3. While Rail Form A does not distinguish explicitly between main-line and branch-line costs, as API asserts, these costs are embodied in the costs for the two types of line-haul service; way-train and through train service.

4. API asserts that operating factors should be based on special studies. Special studies are preferable. However in the absence of them, and in investigations as broad as this, determinations may be made on evidence lacking such specificity.

5. API alleges that there is a coefficient of correlation of only 24 percent shown in the Commission workpapers underlying the variability study. This allegation of a coefficient of correlation of 24 percent appears to be the result of a misinterpretation of the coefficient of determination (R^2) given in staff workpapers. Apparently, this statistic was considered to be the coefficient of correlation (r). Although irrelevant to this proceeding, further inspection of these workpapers indicate that this relatively low coefficient of determination is an exception. The variability ratios used in Rail Form A are the best known approximations available for separating expenses between their variable and constant components.

6. API criticizes the introduction of fully allocated costs in this proceeding. The comparison of revenue and variable costs, states API, is the only consideration of worth, since any rate which exceeds variable cost makes a contribution to overhead and profit.

While the Commission uses the ratio of revenue-to-variable cost as the basic unit of comparison between rates on virgin and
356 I.C.C.

recyclable commodities in this proceeding, the computation of revenue to fully allocated cost ratios is not meaningless or illogical as API implies. Fully allocated costs represent those costs which must be covered if the firm is to remain viable. Thus, while the ratios of revenue to fully allocated costs are provided for information in this proceeding, such ratios are not meaningless, as API implies.

B. EPA's comments.—EPA criticizes respondents' presentation for not being comparable and not reflecting special operating characteristics of the commodities under study.

With regard to the presentation of results, respondents have essentially complied with the outline for the presentation of evidence as contained in the order instituting this investigation and, therefore, have met the minimum requirements of this proceeding. This is particularly true for the submissions of the western railroads. The incomplete data submitted, the inclusion of duplicate movements and paper rates, and the presentation of results only for individual movements, is less than a superlative effort.

The railroads contend that their failure to take special factors into consideration was caused by the magnitude of this investigation and the limited amount of time in which respondents had to prepare their submissions.

Commission's analysis of cost evidence.

General cost methodology.—The Commission has computed ratios of revenue-to-variable cost for the movements submitted by respondents. This ratio was computed by dividing the revenue per ton by the variable cost per ton.

The revenue per ton was taken from the movement data submitted by respondents.

In addition to the variable costs computations, fully allocated costs are developed for these movements with constant costs distributed on three basis, i.e., ton and ton-mile, car and car-mile, and dollar basis. As noted, the cost estimates provided are for the representative movements of record with the exception of the so-called "paper rates." Also, no cost estimates are provided in those instances where sufficient information was not available to prepare the necessary data.

These cost estimates utilized regional average costs adjusted to reflect operating practices as described below. These adjusted regional average costs, which are stated in dollars per net ton are at
356 I.C.C.

the October 1975 level of costs, are compared with the rate per net ton which reflect the Ex Parte No. 313 rate level.

The variable and fully allocated costs are based on the unit costs shown in *Rail Carload Cost Scales by Territories for the Year 1974*, Statement No. IC1-74, prepared by the Commission's Cost and Valuation Section. In addition, the costs in these tables reflect an updating to an October 1975 level based on the methods outlined in *Rail Carload Costs Scales by Territories as of January 1, 1958*, Statement No. 2-58.

Variable costs consist of: (1) the variable portions of freight operating expenses, rents and taxes (excluding Federal income taxes), and (2) the variable portion of the "cost of capital", excluding any allowance for Federal income taxes. Fully allocated costs consist of the variable costs plus an allocation of the constant costs which are composed of: (1) the constant portions of the freight operating expenses, rents and taxes (excluding Federal income taxes), and (2) the constant, or remaining, portion of the "cost of capital."

When developing the fully allocated cost for a given movement, the variable cost (ultimately stated in cents per net ton for a comparison to the rate) is developed first and to this cost there is added an allocation of the constant costs. For comparison purposes fully allocated costs are shown on three bases, with constant costs being allocated on the ton and ton-mile basis, the car and car-mile basis, and the dollar basis. To develop the constant unit costs per ton and per ton-mile, and the constant unit costs per car and per car-mile, the dollar numerators, separated between those expenses and cost of capital not associated with distance (terminal) and those expenses and cost of capital associated with distances (line-haul), remain the same. However, the divisors change, that is, for the ton and ton-mile basis the tons originated and terminated, and the ton-miles were used for the respective terminal and line-haul elements, and, for the car and car-mile basis the loaded cars and the loaded car-miles were used in a similar way. The constant unit costs for each of the two bases were then applied to the respective tons and ton-miles, and cars and car-miles, generated by a particular movement. The allocated constant costs thus obtained for each basis is converted to constant cost per net ton, which were then added to the variable cost per net ton to produce the fully allocated costs per net ton for each basis. For the dollar basis an allocation ratio was developed for each region by dividing regional total costs (variable

plus constant) by that region's total variable costs. The variable cost per net ton for a given movement was then multiplied by the applicable regional ratio to produce the fully allocated cost per net ton.

In this proceeding the basic unit of analysis and comparison is the ratio of revenue-to-variable cost. The ratios of revenue-to-fully allocated cost for each of the three methods discussed above are provided for information and will not be the subject of further discussion.

The variable and fully allocated costs shown were computed based on a computerized cost program developed by the Commission's Section of Cost and Valuation. The cost program permits cost determinations for a voluminous number of rail shipments having specific transportation characteristics. In this proceeding the railroads have supplied the Commission with revenue and traffic data for specific commodity movements.

Essentially this cost program applies the various Rail Form A service unit costs to the actual kinds and amounts of services being performed by the railroads in moving specific commodities from origin to destination. Furthermore, to facilitate a more detailed analysis it arrays and groups a multitude of various revenue and cost data into easily understood tables. We have found, however, that time does not permit the detailed analysis that we anticipated.

Adjustments to costs.—The variable costs reflect adjustments to territorial average costs to recognize certain transportation characteristics indicated in the exhibits of record, including the actual route of movement miles, actual or average actual lading weights, and car ownership, whether privately owned or railroad owned. Where the car was other than carrier owned, the ownership costs were removed from variable and fully allocated costs. Costs for each movement were based on the specific type of car used.

In addition, where the actual routing of the movement was shown, line-haul costs were adjusted by removing the interchange costs included in the territorial average costs on a loaded car-mile basis and substituting therefor the interchange cost per car interchanged using the actual number of interchanges from the routings shown in the exhibits of record.

In addition, adjustments were made for movements which involved multiple-car or trainload movements. If a movement had 5 cars or more up to a total of 49, it was considered to be a multiple-car movement and costed as such. Although we stated previously herein that the eastern railroads' use of a 73 car standard for 356 I.C.C.

trainload movements was reasonable, data required to verify this figure were not available. In addition, actual figures such as those shown for the eastern district were not available for the South and/or the West. With this in mind we again as in Ex Parte No. 270, used a figure of 50 cars as a standard for trainload movements in all regions. This determination was based on the average number of cars per movement, not the rate. Thus, a shipment may have moved under single-car rates, but if the evidence of record indicated an average number of cars per movement of five or more, it was costed out as a multiple-car movement.

More specifically, the adjustments for multiple-car and trainload movements are as follows:

For *multiple-car movements*, terminal costs were adjusted by reducing the switching cost per carload by 50 percent at origin and destination, by reducing variable freight train car costs per carload by 50 percent at origin and destination, and by reducing station clerical costs per carload by assuming 75 percent of the cost as being associated with the car and 25 percent as being associated with the shipment. Line-haul costs were adjusted by removing the interchange costs included in the territorial average costs on a loaded car-mile basis and substituting therefor the interchange costs per car interchanged and using the number of interchanges from the routings shown in the exhibits of record.

For *trainload movements*, terminal costs were adjusted by reducing the switching cost per carload by 75 percent at origin and destination, by reducing variable freight train costs per carload by 50 percent at origin and destination, and by reducing station clerical costs per carload by assuming 75 percent of the cost as being associated with the car and 25 percent as being associated with the shipment. Line-haul costs were adjusted by removing the interchange costs included in the territorial average cost on a loaded car-mile basis and substituting therefor the interchange cost per car interchanged (reduced by 50 percent) and using the number of interchanges from the routings shown in exhibits of record. Further, the territorial average inter-intra train switching cost per loaded car-mile was eliminated.

In summary, we have arrived at revenue-to-cost ratios using methodologies similar to that employed by the respondent railroads. Our adjustments reflect, among other things, the more favorable operating characteristics for multiple-car movements in the South and East, loss and damage in the West, and a more accurate determination of trainload movements of iron ore in the East.

C. Display of commission's results.—To facilitate a better understanding of the revenue and cost data, 6 tables displaying the cost results have been developed:

1. The number and percent of movement where the revenue-to-cost ratios fall below variable and/or fully allocated costs, i.e., ratios less than 100 percent (Table 1.)

356 I.C.C.

2. A frequency distribution showing the number of revenue-to-cost ratios falling in percentage blocks ranging from below 95 percent to 230 percent and over. In addition, the simple average ratios of revenue-to-variable cost and revenue-to-fully allocated cost are shown. (Table 2.)

3. The range of ratios computed for a commodity group, i.e., the lowest ratio of revenue-to-variable cost and the highest ratio as well as the simple average ratio. (Table 3.)

4. A frequency distribution showing the number of movements by weight bracket and the simple average ratio of revenue-to-variable cost for each bracket. (Table 4.)

5. A frequency distribution showing the number of movements by mileage blocks and the simple average ratio of revenue-to-variable cost for each mileage block. (Table 5.)

6. The weighted average ratio of revenue-to-variable cost for each commodity by region. (Table 7¹⁶). (The key figures in this investigation.)

Because of the voluminous nature of these tables, and in view of the statutory time constraints, the tables will be placed in the official docket rather than appended to the report.

Additional comments.

1. In the discussion for the various commodity groups the following clarifying comments apply:

a. The respondent railroads' results reflect the weighted average ratio for the East and South and the simple average ratio for the West, as the western railroads present no summaries, only individual movement results.

b. The Commission's results are based on interstate movements only.

c. The inclusion of a movement in a territory is based on the origin territory.

d. Because the submission of the Western railroads contains movements which originated on southern or eastern railroads, in some instances the Commission's results for a given commodity include ratios for more movements than shown in respondents' results.

e. In this proceeding the terms "revenue-to-variable cost" and "rate-to-variable cost" used in the comments and tables are used synonymously.

f. Due to differences in the method of computation and due to rounding, the simple average ratio of revenue-to-variable cost shown in the Commission's display of results may vary by one percentage point.

2. With regard to the Commission's revenue-cost computations the following comments apply:

¹⁶No table 6 was developed.

- a. To the maximum extent possible duplications and paper rates were deleted.
- b. The weighted average ratio of revenue-to-variable cost is based on the estimate of annual tonnage for the year 1975 shown in the submissions of the respondent railroads. The estimates were rounded off to the nearest 1,000 tons with the exception of low annual tonnages (under 1,000 tons), which were rounded to either 500 tons or 1,000 tons. With respect to many movements in the West, estimates of annual tonnage were not submitted, for those movements we assigned a minimum figure of 500 tons.
- c. Where traffic originated, terminated, or received intermediate handling on a Canadian railroad, the costs applied were those of the cost region closest geographically to the movement on the Canadian railroad. For example, to a movement terminating in Vancouver, British Columbia, region VI costs were applied as this is the cost region closest in proximity to that part of Canada. This represents the best approximation in the absence of costs for Canadian rail service.
- d. Data for movements of beverage containers, returned empty (STCC No. 42 111 42) indicates the use of railroad-owned refrigerator cars. Closer examination reveals that the type of car would be a boxcar general service equipped. This car type was used where the mechanical designation for the car type (R-103) in the data of record indicates the use of a damage-free car with railroad ownership.

PART II

HISTORICAL EVIDENCE ON UTILIZATION OF RECYCLABLE MATERIALS

The railroads also submitted evidence on the use of recyclable and virgin material and their prices when known. The percentage increase in rates caused by general rate increases and in many instances the percentage of the freight cost to the price of the commodity was also shown. Comparing this data, the railroads reached the conclusion that there was no correlation between the amount of traffic transported and general rate increases. Instead, the movement of scrap is generally determined by the level of activity in the consuming industry, for example, the automobile industry. This, it is argued, supports their position that rates have not affected the movement of the involved commodities. A more complete analysis of the impact of rate increases and the effect of rates on the movement of traffic is presented by the Gellman Research Associates, Inc., on behalf of all railroad respondents, in part III.

Opposing shippers.—The various scrap dealers and organizations contend that the respondents are in error in arguing that rates have no significant effect on the movement of recyclables. It is alleged that in many instances, general rate increases have limited the market in which recyclable materials can be sold or procured and caused scrap dealers to either discontinue selling to a certain customer or to divert the traffic to private or for-hire motor carriers.

356 I.C.C.

The alleged sensitivity of the movement of recyclables to changes in rates, is based on a number of factors. First, a scrap dealer may be operating at a very low margin of profit and can ill-afford increased costs. Secondly, in many instances, the scrap dealer pays two transportation charges: the inbound charge to its scrap yard and the outbound charge to the smelter or mill. Thirdly, the transportation rate compared to the generally low value of the certain recyclables shown means that transportation costs are a major component of the selling price.

Evidence is presented on the mechanics of the recycling industry, the consumption and processing of scrap, and the effect of rate increases on the movement of traffic. It is argued that the railroads have aggravated the unreasonable and distorted rate base structure of recyclables by the various general rate increases.

NARI argues that freight rates on recyclables distorted by successive general increases have been a major factor in:

- (1) Causing existing markets for many recyclable commodities to be lost;
- (2) Causing potential markets for recyclables to be economically unattainable, thereby thwarting new capital investments in recycling facilities;
- (3) Causing the range from which solid waste materials can be recovered and marketed to be narrowed;
- (4) Causing producers and users of recyclable solid waste materials to curtail or terminate their business activities;
- (5) Causing recycling levels in practically all commodities to fall and lose competitive positions with competing virgin materials;
- (6) Causing the economics of recycling to be highly cyclical, by compounding costs of resource recovery to a point at which many commodities are "costed out" of the marketplace in all but boom periods;
- (7) Causing the overwhelming proportion of new research and development in product applications to be devoted to the use of virgin materials in view of their increased attractiveness from a competitive standpoint;
- (8) Causing integrated companies with domestic and foreign sources of virgin supply to intensify their mining exploitations and tree harvesting activities and acquisitions in view of the more competitive attractiveness of virgin materials; and
- (9) Causing large users of raw materials to abandon or ignore the national call for a recycling ethic in favor of continued dependence on virgin materials, both from domestic and overseas sources.

356 I.C.C.

If the rail rates are reduced, it is argued, that the movement of recyclable commodities will be encouraged. NARI contends that if the discriminatory and unreasonable rate structure is eliminated, the following percentage increases in the recycling of certain commodities will result: (1) 80-percent to 100-percent increase in waste paper; (2) 100-percent increase in aluminum; and (3) 30-percent to 40-percent increase in copper, lead, and zinc.

Governmental participants.—The EPA alleges that the carriers generally have failed to submit data under this part and have instead, merely made unsubstantiated assertions that rail rates have no effect on the movement of the involved traffic.

Rebuttal.—Gellman Research Associates, Inc. (Gellman), on behalf of respondents, argues that NARI is incorrect in alleging that the disparity in rates between recyclables and virgin commodities has increased. Some adjustment should be made in the comparison to take account for the effect of inflation on changes in railroad rates. Using NARI's data (tables 2-4 below), it is shown that scrap rates, relative to virgin rates, are less expensive today than they were in 1959, and therefore, the relative rate disparity between scrap and virgin rates had declined. It is also pointed out that except for paper in the southern territory, scrap rates have increased at a slower rate than those for virgin commodities. Rail rate changes for scraps since 1959 are thereby concluded to have been more favorable than changes for virgin commodities.

TABLE 2

Relative railroad rates for scrap versus virgin commodities: 1959-1975

Commodity	(SCRAP RATES)			(VIRGIN RATES)		
	Ex Parte No. 223			Ex Parte No. 313		
	(¹)	(²)	(³)	(¹)	(²)	(³)
Paper.....	1.917	1.734	1.963	1.662	1.663	2.000
Aluminum.....	1.640	1.709	1.968	1.443	1.692	1.926
Copper.....		1.517	1.273		1.409	1.132
Zinc.....	1.297	1.442	1.542	1.162	1.271	1.363
Lead.....		3.600			3.120	

¹ Eastern territory.

² Western territory.

³ Southern territory.

⁴ Ex Parte 256.

Source: Reply testimony of John C. Vaccaro.

TABLE 3

Percentage change in relative rates for scrap versus virgin commodities: 1959-1975

Commodity	Eastern territory	Western territory	Southern territory
Paper.....	-13.3	-4.1	+1.9
Aluminum.....	-12.0	-1.0	-2.1
Copper.....		-7.1	-11.1
Zinc.....	-10.4	-10.6	-11.6
Lead.....		-13.3	

¹ Comparison made between Ex Parte No. 256 and Ex Parte No. 313 rates.

Source: Reply testimony of John C. Vaccaro.

TABLE 4

Indexes of absolute and inflation adjusted changes in railroad rates for scrap and virgin commodities 1959-1975

Commodities	Index of absolute change in rates (1959-1975)			Index of change in rates adjusted for inflation (1959-1975) (1957-59 dollars)		
	(¹)	(²)	(³)	(¹)	(²)	(³)
Paper waste.....	182.8	197.4	181.1	97.5	105.3	96.6
Pulpwood.....	210.9	205.9	177.8	112.5	109.8	94.8
Aluminum scrap and dross.....	186.6	195.1	169.1	99.5	104.1	90.2
Bauxite ore, alumina, calcined.....	212.0	193.0	171.4	113.1	119.7	106.3
Copper scrap.....		183.7	183.3		113.8	97.7
Copper ore and concentrate.....		197.8	206.1		122.9	109.9
Zinc scrap and dross.....	190.4	184.1	187.8	101.5	98.2	100.2
Zinc ore and concentrate.....	212.5	205.9	212.5	113.3	109.8	113.3
Lead scrap.....		185.7			99.0	
Lead concentrate.....		214.3			114.3	

¹ Eastern territory.

² Western territory.

³ Southern territory.

⁴ Comparison for 1967-1975.

Source: Reply testimony of John C. Vaccaro.

Handbook of Labor Statistics 1976, U.S. Dept. of Labor, Washington, D.C.

PART III

SENSITIVITY OF RECYCLABLE MATERIALS TO CHANGES IN TRANSPORTATION RATES

Respondents and supporting shippers.—It is urged by respondents and some shippers, that virgin materials do not compete with recyclable materials. They contend that the materials cannot be substituted for each other in the initial manufacturing stages, or if they can both be used, that the amount is fixed. Therefore, it is a complementary relationship, rather than a competitive relationship. Evidence was submitted on the production processes of the various recyclable and virgin materials, the amount of materials required and the products produced from each. Respondents allege, that even if the competitive relationship were viewed from the point of whether the end products compete, that the differing nature of the end products and the different uses thereof, still preclude a finding of competition.

An examination of the competitive relationship between certain recyclables and virgin materials, and the sensitivity of the movement of recyclables to changes in rates, is also undertaken in the Gellman study, which was submitted on behalf of all respondents.

The objective of the Gellman report is to establish that the movement of scrap is unaffected by railroad rates. Gellman estimates the sensitivity of transportation demand to changes in transportation costs for several broad categories of scrap. Price elasticities for these commodities were derived from a mathematical formula which requires three inputs:

- (1) the sensitivity of total supply to changes in the price of the transported commodity.
- (2) the sensitivity of total demand to changes in the price of the transported commodity, and
- (3) the ratio of transportation cost to the market price of the transported commodity.

Using estimates of demand and supply elasticities from previous studies and the ratio of the composite price index for scrap to railroad transportation rates, Gellman calculates transportation demand elasticities for the several categories of scrap. They then attribute these elasticities to the railroad market, concluding that the movement of scrap by rail is insensitive to railroad rates. They thus find that railroad rates do not interfere with movements of

356 I.C.C.

scrap by rail. Individual roads also submitted arguments and data. A more indepth analysis of their conclusions as to the particular involved commodities is contained in part III for that commodity.

The study does not consider intermodal competition. The mathematical formulation used to estimate the sensitivity of waste and scrap shipments to the level of transportation rates considers transportation as a whole and not by individual mode, e.g., rail, motor, barge. The study does indirectly imply a lack of injury to the recycling industries since it demonstrates that the overall movement of waste and scrap materials is insensitive to transportation costs.

Opposing shippers.—NARI points out that the various end-products (paper, secondary aluminum ingot, copper or lead, et cetera) compete with the various end products produced from virgin materials.

NARI also takes the position that a determination of whether or not there is competition between recyclable and virgin materials has been rendered moot because the Congress has stated in Section 204(e)(2) that the listed virgin materials compete with recycled commodities, that the section therefore concludes or presumes that the stated virgin materials compete with specified recyclable materials; that the Commission is to assume that a full competitive relationship exists; and that the attempt by respondents through the Gellman study to show that there is no competition between commodities or no effect by rates on the movement of traffic, is irrelevant. NARI also supplies excerpts from various governmental and private reports where it has been concluded according to NARI that freight rates have an effect on the movement of recyclables and that steps should be taken to eliminate rates which favor the movement of virgin materials over recyclables. In conclusion, NARI argues that all unjust, unreasonable, and discriminatory rail rates on recyclables must be eliminated.¹⁷

Other shippers and shipper organizations submitted information on the various processes used in the manufacture of commodities from virgin materials and scrap. Although scrap (except in steel making) generally is not used as an input in the same plant, facility, or machine as a virgin material, it is contended that this is no indication that scrap does not compete with virgin materials. In many cases, the end products are undistinguishable and can be substituted equally by manufacturing consumers. Therefore, according to these protestants, it is incorrect to view competition as

¹⁷In answering NARI's assertions, we view the legislative mandate as one of study and do not view it as providing definitive answers.

merely whether scrap can be substituted for virgin materials at the initial manufacturing stage. The Gellman study, it is argued, does not consider this competitive relationship between the end products or the cross-elasticity of demand between the products.

Governmental participants.—EPA states that in view of the increased national role of materials conservation, transportation rates and service should support, or at least not obstruct the efficient shipment of recyclables for reuse. It is argued that changes in rates have affected the movement of recyclables, and EPA criticizes the Gellman study's analysis and conclusions on these points.

First, EPA argues that Gellman only considers four recyclable commodities. Secondly, it states that transportation rate sensitivity is not addressed on an intercommodity basis. For example, Gellman should have looked at the transportation rate sensitivity of cullet, as distinguished from that of glass sand, when rates for both are increased at different amounts, and the effects thereof on their delivered price. Thirdly, the averaging technique used in the transportation cost factor, which is part of Gellman's mathematical formula, is not representative of the national average transportation rate nor is it correct to use one transportation factor as a multiplier in an 8-year series (1963-1971).

Government policies.—A thorough discussion of government programs, legislation, and policies is set forth in the Final Environmental Impact Statement. Generally there are certain tax advantages (depletion allowances) which favor the utilization of virgin materials over recyclables.

Rebuttal.—Gellman states that opposing parties are incorrect in alleging that their analysis fails to consider the possible substitutability between scrap and virgin inputs. They argue that consideration of economic and technological substitutability, have been discussed, since factors in addition to technology determine whether one input can economically be substituted for another. Even if the commodities are perfect technological substitutes (as assumed in determining elasticity of demand), their econometric analysis reveals that there are few indications that scrap and virgin commodities are economic substitutes; that is, market parameters indicate that such substitution is not economically feasible. Gellman contends that opposing parties have failed to adequately consider the nature of this economic substitutability.

Although Gellman does not agree that end products from scrap and virgin inputs compete, they state that in their econometric

356 I.C.C.

analysis used to derive the rail transport demand elasticity, it is assumed that there is infinite substitution between the end products.

They also argue that EPA is incorrect in alleging that since Gellman used a single rail rate/composite price ratio, its procedures are erroneous. In their equation the rail rate composite price can only vary between one and zero. Regardless of what value this ratio takes, the rail transport demand elasticities for the commodities it considered are as follows:

TABLE 5

Sensitivity of rail transport demand elasticities to changes in the rail rate composite price ratio (A)

Commodity	Rail transport demand elasticity if A = 0	Rail transport demand elasticity if A = 1
No. 1 Heavy melting steel.....	0	.5889
No. 2 Bundles of steel.....	0	.1189
Obsolete aluminum scrap.....	0	.0254
Obsolete copper scrap.....	0	0
Obsolete paper scrap.....	0	.16

Therefore, the rail transport demand for these commodities is inelastic regardless of the values of the ratio. Although EPA also criticized the rail rate/composite price ratios for No. 1 heavy melting steel, EPA's ratio would indicate that rail rates play less of a role in determining the rail movement.

Lastly, Gellman takes exception to EPA's criticism that it was unable to extend its results to October 1975 because of theoretical problems. The econometric model is based on a theoretical description of the interaction between input markets and transportation markets, therefore data for a specified period of time is irrelevant. It also notes that its estimates of rail transport demand elasticity are based on studies using the standard procedures of the profession and on data published in *Increased Freight Rates and Charges, 1973—Recyclable Materials*, 349 I.C.C. 250.

Discussion.—The concept of demand elasticity is basic to the understanding of the supply and demand conditions of an industry.¹⁸

¹⁸Price elasticity and demand elasticity are interchangeable terms which refer to the sensitivity of demand to changes in price.

Strictly speaking, demand elasticity is defined as the percentage change in the quantity demanded divided by the percentage change in price. Demand is said to be inelastic when the percentage decrease (increase) in the quantity demanded is less than the percentage increase (decrease) in price. Alternatively, demand is elastic when the percentage change in quantity demanded is greater than the percentage increase (decrease) in the price. When demand is elastic, a rate reduction yields increased revenue by generating additional traffic. On the other hand, when demand is inelastic a rate increase yields additional revenues through a less than proportionate loss of traffic. Few products, however, have the same demand elasticity for the entire range of prices. Demand may be inelastic for a limited range of prices and become elastic above that range.

The demand for intercity commodity transportation is a derived demand. It is derived from the demand and supply conditions of the commodity being transported. Transportation demand can be viewed at various levels of aggregation ranging from that of the Nation as a whole to the demand for the transportation of an individual commodity between a specified pair of points. In addition, the demand for transportation can refer to all modes combined at any of these levels of aggregation or for a specific mode. Although studies of demand elasticity can be conducted at any level of aggregation, studies performed at the national level with the assumption of a single mode of transportation give the most consistent results. In general, as the level of aggregation is reduced from broad commodity classes to specific commodities and from the national level to regional or local levels, the demand elasticity for transportation increases since more competitive possibilities are brought into focus. In practice, measuring the effect of a price change may become very complex, especially at very disaggregated levels. Thus the estimation of the demand for the transportation of a commodity for all modes combined has established itself as a norm.¹⁹ Estimates of demand elasticities for specific commodities between specific origins to specific destinations *via* a specific mode require the inclusion of too many variables to be reliable.

A review of several elasticity studies indicates that taken at the level of aggregation adopted for such studies, transportation demand is usually inelastic. An inelastic demand is indicative of several marketing conditions. The most common reason for transport

¹⁹See, for example, A. L. Morton, "A Statistical Sketch of Intensity Freight Demand," Highway Research Record, No. 296 (Washington, D.C.: Highway Research Board, 1969).

demand to be inelastic is for transportation costs to be a small portion of the value of the commodity transported.

A low ratio of transportation costs to the market price of a transported commodity has the effect of diluting the impact of the transportation rate increase on the final price of the product. Transportation demand elasticity is further influenced by the price elasticity of demand for the commodity transported. When commodities are broadly defined, the role of substitutes determining price elasticity is sharply reduced. At these levels of aggregation, demand elasticities for product groups tend to be low and are consequently reflected in a low elasticity of demand for transportation. Supply is also an important element in determining transportation price elasticity. The more inelastic supply is (other things being equal) the more price inelastic the demand for transportation will tend to be.

As noted above, many transportation studies demonstrate that, as in the case of the Gellman report, the demand for transportation tends to be price inelastic when commodities are broadly defined and a single mode of transportation is assumed. Under these conditions, transportation costs do not unduly restrict the movement of these commodities.

Elasticity studies represent an improved approach to marketing and pricing problems. They are, however, not perfect and should be carefully interpreted. First, aggregate studies only describe the collective impact of rate changes for a broad category of commodities. They give no indication of how individual shippers are affected. Although some shippers may lose substantial business or traffic, others may gain business at their expense. In the aggregate, only the net impact is considered. Similar arguments can be made for individual commodities included within the broad classifications.

It must be recognized that the rates used in aggregate demand studies are in fact indices which reflect the composite rate structure for broad commodity groups. Movements in the index give no indication of whether rates on individual commodities change or whether the composition of commodities changes. Increases or decreases in this index may stem from either of these entirely different sources. Even when the source is the movement of individual rates, the results may be misleading. Small or negative changes in some rates may offset large increases in others. A change in the composition of commodities being transported, however, may lead to totally false conclusions. A trend toward the transportation

of commodities with higher rates would cause the index to rise in the complete absence of any rate increases. When changes in both individual rates and product composition occur simultaneously, it becomes difficult to interpret the resulting price quantity relationship.

Second, conclusions on elasticity are limited to the range of prices experienced in the data base. Statements on elasticity become weaker as one moves out of this range. Third, the implication of a single transportation cost is that a single mode (railroads) monopolizes the transportation market for a specific commodity group. The elimination of this assumption requires the evaluation of intermodal effects. Inclusion of intermodal price competition would have had the effect of increasing the transport demand elasticity for a particular mode since the commodity could simply move by a lower cost mode.

The Gellman study is a classic example of the aggregate approach to estimating transportation demand elasticities. Five broad categories of scrap are analyzed under the assumption of a single mode of transportation. The study provides a quantitative measure of how the movement of scrap has historically been affected by transportation rates.

The analysis is essentially short run. It does not consider the impact of changes in technology of refining and processing scrap or possible changes in the supply and demand condition for virgin raw materials. Changes in these or other parameters could make transportation demand for scrap more price sensitive. Their findings of an inelastic demand suggests that taken as whole, past increases in transportation rates on scrap have led to less than proportional declines in scrap movements. These findings imply that transportation rates have not been unduly discriminatory. Furthermore, Gellman suggests that these same conditions would continue for a (limited) range of future rate increases.

Gellman's conclusion that "**** the amount of recycled materials moving by rail is not significantly affected by rail rates" is, however, subject to question. In those markets where scrap can feasibly be transported by another mode, the significance of railroad rates may be masked by the multimodal nature of the aggregate analysis. In fact, Gellman's conclusion could only be validated by either of two conditions. The first would require modal shares to be fixed by technological or institutional constraints. Under this condition scrap would be constrained to movement by rail. Historically, some commodities would not be accepted by processors unless it arrived

356 I.C.C.

by rail. In recent years this requirement has become less common. The second condition would require railroad rates to set the "umbrella" for other rates. This is tantamount to fixing modal shares. If either of these conditions do not exist, then an increase in rail rates may result in less of a demand for rail transportation, and a shift in the traffic from rail to another lower cost mode. Although the amount transported may remain constant (rates, therefore, having no overall effect), the share of traffic handled by the railroads may decrease. Therefore, an increase in rail rates will effect the amount of traffic moving by rail.²⁰ Since there is no supportive evidence on the presence of either of the above two conditions, the conclusions of the Gellman report on this issue must be rejected. However, the other evidence presented therein, such as that on the competitive relationship of the commodities, will be considered.

PART IV

EFFECTS ON INDIVIDUAL RAILROADS

Respondents and supporting shippers.—Respondents presented evidence showing the importance, from a tonnage and revenue standpoint, of recyclable and virgin materials traffic. Generally, the percentage amount of the recyclables handled was relatively low with the exception of scrap iron and steel. However, the carriers normally insisted that this, as is all of the traffic, is important to their total revenues and profits. The percentages are deceptive they argue, for the percentage of any one commodity will be relatively low considering the thousands of commodities transported by a railroad. Certain respondents also argue that no known diversion of recyclable traffic has taken place because of general rate increases, and in fact the amount of tonnage carried has increased.

Opposing shippers.—It is contended that if the rates on recyclables are lowered, the volume of recyclables shipped will increase and, therefore, overall the revenues of the carrier will increase.

Governmental participants.—EPA submits that the only evidence presented by the railroads under this category was the

²⁰At the oral hearing on the rebuttal evidence (transcript pages 2437-2438), the Administrative Law Judge specifically asked witness Allen of Gellman Research Associates, whether intermodal competition had been taken into account in determining the effect of increases in rail rates. The witness answered that their econometric analysis considered "total transport demand elasticity" that is the amount moving by all modes, and found it to be inelastic. He also stated that, "The elasticity for any single mode may in fact be elastic. It depends on the competition of the carriers."

tonnage/revenue ratio of recyclables to total traffic originated. It argues that information on traffic shifts among railroads and between railroads and other modes, and the effect of rate changes on revenue and profit should have been submitted so that the effects of a change in rates can be determined.

PART V

SERVICE TO SHIPPERS OF RECYCLABLE COMMODITIES

Respondents and supporting shippers.—It is argued by certain carriers that unless the railroads can retain their present revenues, they will not be able to meet the public need for adequate service. A decrease in revenues, it is also contended, will reduce a carrier's ability to increase its fleet or will cause a decline in the size of its present fleet.

Opposing shippers.—Some shippers argue that an increase in rates have not brought a like improvement in the service offered by a carrier. If increased rates are justified, it is contended, then the service should also improve.

Governmental participants.—The eastern and western railroad associations, EPA argues, neglected to respond to this question except for a discussion of car supply.

PART VI

ALTERNATIVE RATE STRUCTURES

Respondents and supporting shippers.—Very little information was submitted by respondents under part VI and there was no evidence presented under part VII topic. Generally, no suggestion was made as to alternative rate structures. In other instances, a carrier would indicate that it was open to suggestions by shippers to an alteration in rates or the implementation of incentive rates.

Opposing shippers.—Rates on recyclables are alleged to be discriminatory and unjust and unreasonable, according to NARI, because recyclables, by the carriers' own submission, carry a greater burden than their competitive virgin natural resource material. We note that in *Investigation of Railroad Frt. Rate Structure—Coal*, 345 I.C.C. 493, 504-506 (1976), the Commission specifically declined to spell out precise standards in terms of cost for the upper limits of the zone of reasonableness.

In conclusion, NARI contends that the zone of reasonableness for recyclables lies between the minimum of 100 percent of variable cost and the national average of 131 percent and that rates can be established at this level by: (1) immediately reducing the recyclable rate structure so that their burden ratio is no greater than that of its competitive virgin natural resource material; (2) making further rate adjustments after determining a zone of reasonableness; and (3) instructing the carriers to develop a more aggressive marketing program in the area of recyclable material.

On brief, NARI supplies data on percentage reductions that would be necessary to achieve this percentage for the nonferrous metals. In the alternative, it suggests that instead of ordering these reductions, the Commission could cancel or remove the general increases approved by the Commission in recent years which starting with Ex Parte No. 267-B through Ex Parte No. 313 total 44.6 percent.

In requesting relief for textiles, pulpwood, and woodchips, NARI requests that rates on waste paper be reduced to variable cost in the East and South and 105.6 in the West. This could be done by percentage rate reductions or the canceling of general increases on these commodities.

Institute of Scrap Iron and Steel (ISIS) suggests that the discrimination against the movement of scrap iron and steel can be eliminated by requiring holddowns on this commodity in future general rate increases equal to the increase in cents per ton granted on the average ton of iron ore.

U.S. Reduction (on behalf of NARI) also suggests that new rates reflecting reduced rate in exchange for shippers tendering increased loads in 20,000-pound increments over present minimum weights, up to 140,000 pounds. For example, present 80,000-pound minimum weight would have additional incentive rate scales for 100,000-, 120,000-, and 140,000-pound minimum carload weights. This incentive for heavier loading will, it is argued, increase traffic and per car revenues.

Some shippers indicated that they were willing to accept general freight rate increases as long as there is no discrimination in cents per ton against scrap. If the Commission determines that discrimination or other types of unlawfulness exists, then it should be eliminated slowly in future general increase proceedings through holddowns.

Governmental participants.—Rate and service innovations should stimulate the movement of recyclables according to EPA. Innovations, other than those based on shippers tendering increased

loads, should be considered. However, EPA contends that respondents have failed to submit sufficient evidence under this section.

PART VII

OTHER EVIDENCE

In this part, the participants discussed a number of factors not mentioned elsewhere such as the beneficial effect on the environment (conservation of natural resources, elimination of waste, and energy savings) that increased recycling could have. It was also suggested that the railroads alter the definition of a recyclable, which they use in their tariffs. It states that a recyclable is:

*** any product which has been or would ordinarily be discarded as worthless, defective or of no use, and the processing of such commodity transported in order to produce a commodity of the same kind as the commodity transported or to produce a previous state of the commodity transported.⁴¹

This definition does not include scrap or waste which is used for a purpose different than its previous use. The respondents contend that such commodities as terne plate (used in the processing of mined copper) and bakery waste are not included within the definition of recyclable.

Conclusion.—Congress has set forth a definition of a "recyclable material" in section 204(e)(1) of the 4R Act which is broader than that contained in the railroads' tariff definition. It defines a recyclable material as "any material which has been collected or recovered from waste for a commercial use, whether or not such collection or recovery follows end usage as a product." This expanded definition of a recyclable is, we believe, a more accurate definition than that used by respondents. Although, the definition in the statute specifically applies to section 204, we conclude that it should be adopted as the respondents' tariff definition of a recyclable material. We will, therefore, order that the tariff definition be modified accordingly.

However, because of the limited evidence on the nature of some of the contended recyclable commodities, such as tinplate for copper precipitating purposes and the outbound movement of

⁴¹See, Note 1, item 680-A of Supplement 5 to Ex Parte No. 310-A, I.C.C. No. 5-1257.

dehydrated and processed bakery waste, we will not make a determination as to whether in fact these commodities are recyclables.

FEIS.—The Final Environmental Impact Statement (FEIS) was served in this proceeding on January 4, 1977. The following specific conclusions reached, as follows, are adopted.

- a Iron and steel scrap.—Numerous demand analyses show that the utilization of steel scrap is virtually unresponsive to price, with an approximate transportation demand elasticity of -0.075. An important constraint on the substitutability between steel scrap and iron ore is the technological limitations on furnace inputs. The impact of freight rates will have a small, and insignificant, impact on the environmental profile of steelmaking and the attainment of steel industry compliance with Federal pollution regulations;
- b Aluminum.—Recycling of aluminum offers considerable energy savings due to the reduced need for energy intensive bauxite refining. However, demand analyses show that the demand elasticity for scrap aluminum (-0.0254) and the proportion of rail cost to total price (about 5 percent) are very small, so that the effect of freight rates is negligible. The impact of freight rates on the environmental profile of aluminum making is imperceptible;
- c Copper.—The economic analysis of scrap copper utilization indicates that freight rates will not have a significant impact on the industry environmental profile. Freight rates are only about 2 percent of the total value of scrap copper. Consequently, no environmental impacts are attributed to freight rates;
- d Lead.—The consumption of lead is somewhat sensitive to price with a price elasticity of -0.322. However, because transportation costs are only about 6 percent of total scrap price, the economic impact of freight rates is minimal. No environmental impacts were identifiable;
- e Zinc.—Recovery of obsolete scrap zinc is difficult because zinc is typically used in combination with other metals, and presently only about 5 percent of total zinc is recovered. Consequently, no economic or environmental impact of freight rates were identified;
- f Paper.—Paper recycling is important because wastepaper represents a large proportion of solid waste generated domestically and forest resources may not be able to meet demand. While the environmental profile of paper production from wastepaper offers considerable savings over production from pulpwood, the small economic impact of freight rates indicate that transportation costs will not play a significant role in paper recovery;
- g Cullet.—The principle constraint on cullet recovery appears to be the lack of technologically feasible methods of separating glass. Cullet is readily substitutable for virgin materials and is more environmentally efficient. Since cullet demand is limited by the development of separation technology, no environmental impacts were attributed to freight rates;
- h Plastics.—Recovery of plastics, like cullet, is limited by the need to separate plastics by type which is not currently feasible. Plastic has a high energy conversion value in municipal solid waste, such that conversion appears more efficient than recovery. No environmental impacts were attributed to freight rates;
- i Textiles.—Textile recovery is hindered largely by the increasing use of synthetic fiber blends which make recovery impossible. No environmental impacts were attributed to freight rates;

- a Rubber.—No economic or environmental impacts identified; and
- b Ashes and blast furnace byproducts.—No economic or environmental impacts identified.

For none of the above materials is transportation cost a significant factor in the overall economic and technological problem of recycling. Close examination of the environmental profile of each industry showed that no significant environmental impacts would result.

Conclusion.—We adopt the conclusions of the FEIS that this action has no significant impact on the quality of the human environment. To the extent, however, that certain of our conclusions differ from those contained in the FEIS, the FEIS is modified accordingly.

METHOD OF ANALYSIS AND DECISIONMAKING

Pursuant to section 204, our formidable task in this investigation involving 40 commodities is to make determinations with respect to two issues. First, we must determine whether the rate structures on recyclables are unjust and unreasonable. And second, we must decide if the rate structures on recyclables are discriminatory in relation to the rate structures of virgin natural resource material with which they compete. The record in this proceeding is voluminous and, therefore, it is impossible to address every point or contention raised by the parties. Our goal is to consider those contentions which we think bear most heavily on determinations of reasonableness and discrimination. It has been shown in the preceding section that the evidentiary submissions were made on a territorial basis with respect to each of the commodities being investigated. In analyzing the evidence and making our determinations we will generally follow that format herein. The rate structure of each recyclable in official, southern, and western territories will be considered separately.

In the order instituting this investigation, we stated that we would be basing our decisions primarily on cost-revenue relationships. On repetitive movements, respondents have submitted ratios of revenue-to-variable cost and ratios of revenue-to-fully allocated cost. Three methods—the ton and ton-mile, car and car-mile, and dollar basis—have been developed to allocate constant costs and determine fully allocated constant costs and determine fully allocated costs. None of these methods, however, has received universal acceptance. While we recognize that in order to maintain a

viable railroad industry constant costs must be recovered, for our purposes of comparing revenue-cost ratios the use of the ratios of revenue-to-variable cost is satisfactory. We hasten to say that these ratios will not be the sole determinant in this investigation. We will consider all pertinent and significant evidence of record. The following constitutes the fundamental basis for our decisions in this investigation.

With respect to the issue of reasonableness we will look at every recyclable named in this investigation, those in both table I and table II. In the evidence submitted there are two types of data which are the best indicators of reasonableness. One is the freight commodity statistics of the railroads which show the trends in traffic volume over a period of years. For virtually all commodities in this investigation we have seen a steady rise in freight rates through the device of rail general rate increases. The question is what effect have the rate increases and the resulting rate structures had on the volume of traffic moved by the railroads? Has it increased, decreased, or remained stagnant? The other indicator is the comparison of the value or price of the recyclable commodity to its average freight rate. If the freight rate is only a small part of the total price of the commodity indications are that rate is not affecting its movement and the commodity can absorb current rates. We are especially concerned about unusually high ratios of revenue-to-variable cost, and, also, ratios for particular recyclables which are much higher in one territory than the others. Not only will we compare interterritorial ratios of the same recyclables but we will also compare ratios of like or similar recyclables. In cases dealing with the issue of reasonableness the Commission has on occasion applied the doctrine of "relative reasonableness." *Chicago Board of Trade v. Illinois Central R. Co.*, 329 I.C.C. 529 (1967). This doctrine states that a rate may be unreasonable in relation to another, or relatively, as a result of comparing the two. It may also be unreasonable in relation to cost, in relation to a prescribed basis of rates or in relation to any other satisfactory standard which permits us to measure and determine the factual questions presented. Since this investigation involves a broad look at the rate structures of the commodities, a broad view of potential violations of the act is necessary, and all pertinent evidence of record will be considered.

NARI submits that the measure of reasonableness should be simply a ratio of revenue-to-variable cost of 131.8, the average revenue-to-variable cost ratio for *all traffic* moving in the United

States as established by the Commission's *Rail Revenue Contribution Study* for 1972 (the Burden Study). NARI contends that because recyclables are "cloaked with the public interest," they should not move at rates higher than rail traffic generally. We reject this approach as an over-simplification of the considerations involved in railroad ratemaking. Certainly we recognize the public interest attached to recycling; but we are also cognizant of the public interest in a viable and efficient railroad industry, and we do not believe the two are at odds with each other. For some carriers recyclable traffic is important from a revenue and tonnage standpoint. For all it is a source of potential revenue and must be given appropriate consideration. The question of the reasonableness of freight rates must be answered only within the framework of all factors relating to the transportation of the commodities, both from the point of view of shipper and the railroads.

Turning next to the issue of discrimination, we note at the outset that the exact term "discrimination" is used in section 204. Although it is not defined, it seems apparent from the history of the recycling freight rate issue before the Congress and the Commission and section 2 of the Interstate Commerce Act (the act) which prohibits unjust discrimination, that Congress actually intended that we should not restrict ourselves to viewing this investigation under section 2, but we should also consider the broader prohibitions under section 3(1) of the act.²² As is here pertinent section 3(1) provides that it shall be unlawful for any common carrier to make, give or cause any undue or unreasonable preference or advantage to or subject any particular description of traffic to undue or unreasonable prejudice in any respect whatever. Although the

²²The Commission has always recognized the recyclable issue as one judging one commodity versus another as in section 3(1) and not as personal discrimination between shippers as contemplated by section 2. See most significantly *Increased Freight Rates and Charges, 1972*, 346 I.C.C. 88 (1973); and *Increased Freight Rates and Charges, 1973*, 349 I.C.C. 250. *Freight Rates on Recyclables*, Hearings on H. R. 6637 and H. R. 12536 before the House Sub-Committee on Transportation and Aeronautics of the Committee on Interstate and Foreign Commerce, 93d Cong. 2d Sess., ser. No. 93-77, a legislative proposal preceding the 4R Act and section 204, provides a revealing exchange between counsel for NARI and Congressman Shoup, which indicates the term "discrimination" has not been used with exactitude and that what has been desired is simply equality in freight rates between recyclable and virgin materials. The use of section 2 alone would be futile in an investigation of the rate structures of recyclable and virgin commodities because it is concerned with "like and contemporaneous service" (movements between the same points) of "like kind of traffic" (similar physical characteristics, value or market price, et cetera), "under substantially similar circumstances and conditions" (the gamut of transportation characteristics from the type of transportation equipment to the hazards of transportation). Also, a competitive relationship between shippers or commodities—market competition—is not essential to a violation of section 2. *Reduced Seasonal Household Goods Rates*, 332 I.C.C. 512, 517 (1968).

criteria under section 2 and 3(1) differ, the term "discrimination" is often used in reference to both sections for they have a common purpose—the elimination of inequitable treatment by the railroads. See, *United States v. Illinois Central R. Co.*, 263 U.S. 575 (1923) and *New York v. United States*, 331 U.S. 284 (1947).

The issue of discrimination is pertinent only to the commodities listed in table 1 which contains a list of recyclable or recycled materials and a corresponding list of their competitive or potentially competitive virgin natural resource materials. Guided by our traditional standards in section 3(1) cases, we will essentially follow a four-step analysis in determining whether discrimination exists. First we will look at the ratios for the recyclable and virgin commodity and see if there is a difference or disparity between them. Second, if there is a disparity in the ratios, we will then determine whether there is *in fact* competition between the recyclable and virgin commodity. Third, if competition does exist, we will then consider whether the evidence shows that the shippers of the recyclable are being injured in any manner by the disparity. And fourth, we will consider whether there is a difference in the transportation characteristics between the recyclable and the virgin commodity which would justify a disparity in ratios.²³

With respect to the issue of competition, in the meager legislative history of section 204 we find the following:

The record before the Committee indicates that the Commission may not be taking into account the full competitive relationship between recyclable and recycled commodities, on the one hand, and virgin materials on the other hand. A reexamination of that relationship will be necessary if this investigation is to achieve its goal. *Senate Committee on Commerce, 94th Cong. 1st Sess., Rept. No. 94-499 p. 47 (1975).*

We shall heed the expressed intent of Congress. A discussion of the arguments of the parties and our resolution of them will be

²³In typical section 3(1) cases we have stated that in order to support a finding of a violation of section 3(1), it must be shown (1) that there is a disparity in rates, (2) that the complaining party is competitively injured, actually or potentially, (3) that the defendant carriers are the common source of both the allegedly prejudicial and preferential treatment, and (4) the disparity in rates is not justified by transportation conditions. The complainant has the burden of proving the presence of the first three factors, and the defendants have the burden of justifying the disparity, if possible, in connection with the fourth. *Chicago Board of Trade v. Illinois Central R. Co.*, 344 I.C.C. 818, 831 (1973). Because of the scope and generality of this proceeding, and because we are looking at ratios of revenue-to-variable cost and not specific rates, we, of course, cannot follow the criteria exactly. Also, in this proceeding, pursuant to section 204, the burden of proof is on the respondent railroads. Hence, the respondent railroads must address themselves to all of the above criteria. With respect to (3) above, this proceeding is an investigation of the rate structure within territories (and not of individual carriers), and all common carriers by railroads have been named as respondents, therefore the issue of common control is not in dispute.

according to specific recyclables and will be contained in the sections to follow.

In determining whether the shippers of a recyclable are being competitively injured by a disparity in ratios, the significant data here too is the freight commodity statistics indicating the trends in traffic volume. Here the question is, are freight rates causing less of the recyclable traffic to move and encouraging the movement of more of the virgin commodity?

As for the transportation characteristics which would justify a disparity in ratios, they are many and varied depending on the commodities and require a section-by-section analysis.

Lastly, our decisionmaking will, as directed by section 204, also include a consideration of the possible environmental consequences of our decision. The final environmental impact statement that has been prepared by our Section of Energy and Environment is divided according to recyclable commodity.

In most instances the above is the framework in which our decisions will be made. One further note, in making our determinations we will be mindful of the concern expressed by Congress in section 205 in the maintenance of adequate revenue levels for the railroads. Hence, this will be considered before ordering any rate reduction.

SCRAP IRON AND STEEL

(STCC No. 40 211)

The situation with respect to scrap iron and steel is different than it is for the other recyclable commodities being investigated in this proceeding. As has been generally stated in the introductory section herein, on March 19, 1976, two detailed reports were served in Ex Parte No. 270 (Sub-No. 5), *Investigation of Railroad Frt. Rate Structure*, 345 I.C.C. 867. (These proceedings will hereinafter be referred to individually as Sub-No. 5, *Iron Ores* or Sub-No. 5, and Sub-No. 6, *Scrap Iron and Steel* or Sub-No. 6, jointly they will be referred to as Sub-Nos. 5 and 6.) The reports are initial decisions prepared by Commissioner Hardin who was appointed Coordinator of the investigation of the entire freight rate structure of the Nation's railroads. See Ex Parte No. 270, *Investigation of Railroad Freight Rate Structure*, 340 I.C.C. 868 (1971). Sub-Nos. 5 and 6 are two of the subinvestigations instituted in, Ex Parte No. 270, see

356 I.C.C.

Investigation of Railroad Freight Rate Structure, 345 I.C.C. 1, 12 (1973). The procedure that was adopted for all of the subinvestigations in Ex Parte No. 270 is for the Coordinator to issue initial reports and the Commission to receive and rule on exceptions to them, thereby making the ultimate decisions in each subinvestigation.

The fundamental purpose of Ex Parte No. 270 and its subinvestigations was to examine the effect that the series of general rate increases, beginning in 1967 with Ex Parte No. 256, have had on the rate structure of the railroads. More specifically, each subinvestigation, is to focus on (1) the possible self-defeating nature of general rate increases with respect to generating revenues, (2) and any disparities and distortions in rate relationships caused by general rate increases, (3) the uneven effects of general increases on individual railroads, and (4) the effect of general increases on railroad incentive to improve service in line with shipper requirements, *supra*, 345 I.C.C. at 3.

The ultimate objective of each subinvestigation is very broad, and that is "to take whatever corrective action may be shown to be necessary." *Id.* The following were given as examples of the type of corrective action that could be taken:

*** requiring particular rates to be increased or decreased, taking into consideration findings arrived at in [these] investigation(s) when considering individual rate proposals sponsored singly or jointly by the railroads at the suspension or investigation level, considering the findings in this proceeding as supplementing the record in future rail general increase cases, or recommending satutory changes. *Id.*

In referring back to the sections of this report dealing with the history of Ex Parte No. 319 and the evidence in general, it is apparent that this investigation not only has a purpose similar in some respects to that of Ex Parte 270 and its subinvestigations, but the format of the evidence presented herein is patterned after it. Of the two reports, Sub-No. 6, *Scrap Iron and Steel* is the significant one because it contains a study of the rate structure of the recyclable commodity scrap iron and steel, as well as the findings in Sub-No. 5, which are repeated in Sub-No. 6 for purposes of comparing the two commodities.

There are a number of significant differences between this proceeding and Sub-Nos. 5 and 6.

356 I.C.C.

Our mandate is to determine whether the rate structures for recyclable commodities are just, reasonable, and nondiscriminatory. We are not authorized, nor does time permit, our consideration of other forms of unlawfulness. Also, in this proceeding the railroads are named as respondents and have the burden of proving that the above forms of unlawfulness do not exist. In Sub-Nos. 5 and 6 of the record was developed in a nonadversarial manner. Because of the general similarities, we incorporated Sub-Nos. 5 and 6 into this proceeding. We have found that, though there are many similar issues in the subject investigations, there are some specific ones addressed in Sub-Nos. 5 and 6 that are not pertinent to this investigation. Since we are under such severe time constraints, we can deal herein only with the similar issues. Those not related to this proceeding (the findings on which exception was taken) will have to be addressed in other proceedings. Essentially, the unrelated issues are, in Sub-No. 5, *Iron Ores*, the ex-lake movements of iron ore; and in both Sub-Nos. 5 and 6, the 230-percent standard and its use as a rebuttable presumption in complaint cases, and the issue of flat percentage increases in general increase proceedings.

In this investigation, the railroads, as respondents, have filed opening statements. Those statements essentially update the evidence they submitted in Sub-Nos. 5 and 6 to include data, generally, through 1974 or 1975. The important addition they make to the record is the statement by the Gellman Research Associates.

Armco Steel Corporation (Armco), Iron and Steel Company, Republic Steel Corporation and Youngstown Sheet and Tube Company (Armco, Inland, Republic, and Youngstown) are participating jointly in this proceeding as they did in Sub-Nos. 5 and 6. They have filed both opening and reply statements; their position, however, is compatible with or generally in support of the respondent railroads. Various shippers, also parties to Sub-Nos. 5 and 6, have filed reply statements. The major shipper participants are the ISIS, representing the Nation's scrap dealers, processors and brokers, and Northwestern Steel and Wire Company, a major nonintegrated steel producer.

Thus, with respect to scrap iron and steel and iron ores, the record in this investigation is, to say the least, extensive. It consists of the evidentiary record, reports, exceptions and replies to the exceptions in Sub-Nos. 5 and 6; and the various statements, as well as the oral testimony and the briefs and reply briefs, submitted in this proceeding.

At the outset we should note the basic position of the respondent railroads and the integrated steel producers who support them, and the position of ISIS and the nonintegrated producers. The railroads and the integrated producers contends that scrap iron and steel and iron ore do not compete and the rate structures on scrap are just, reasonable and nondiscriminatory. ISIS and the nonintegrated steel producers assert that scrap iron and steel and iron ore are competing commodities and that the rate structures on scrap are discriminatory. Rather than call for immediate reductions in rates, ISIS offers as the appropriate remedy the institution of holdowns on scrap iron and steel in future general rate increases. The level of the holddown sought is the same cents per ton on the average ton of scrap as the cents per ton effect of the percentage increase on the average ton of iron ore. This was done in *Increased Freight Rates and Charges, 1975*, 349 I.C.C. 555 (1975), where there was a holddown in scrap of 28 cents per net ton which reflected the cents per average ton effect of the 7-percent increase on iron ore.

Because of Sub-Nos. 5 and 6, the format in this section on scrap iron and steel and iron ores will be different from the sections dealing with the other commodities.

Here our format will be by issue: first reasonableness then discrimination. We will review the Coordinator's findings with respect to each, describe the exceptions, set out the additional evidence submitted in this investigation, and make appropriate findings.

The record on scrap iron and steel is large and because we have a limited amount of time to analyze and discuss it, there will be times in this section where certain aspects of the scrap and steel industries are not fully explained. We have the Coordinator's report in Sub-Nos. 5 and 6, and reference can be made to them for anything not fully explained herein. We will also not be able to answer every point raised by the parties. Our goal is to make the mandated determinations knowing that the record herein provides a substantial basis for them.

As we have indicated, the issues to be determined in this investigation are whether or not the rate structures on scrap iron and steel are just, reasonable and nondiscriminatory. In Sub-No. 6 the Coordinator found, first, with respect to the issue of reasonableness:

That the overall freight rate structure on scrap iron and steel is compensatory and not unreasonably high, but that some individual rates are noncompensatory and others are abnormally high. (Finding No. 7), 345 I.C.C. at 1199.

And with respect to the issue of discrimination, his finding was:

That the predominant movement of iron ores in trainload quantities makes a higher revenue contribution to the railroads than does the predominantly single-car movement of scrap iron and steel, and that the freight rate structure of these commodities does not discriminate against the movement of scrap. (Finding No. 3), 345 I.C.C. at 1199.

Other findings of the Coordinator in relation to the issues of reasonableness and discrimination were: (a) the demand for scrap is inelastic to changes in the transportation rate charged; (b) the relationship between scrap iron and steel and iron ores in the steelmaking process is, in almost all cases, complementary and not, for transportation purposes, significantly competitive; (c) the delivered price of scrap iron and steel, the higher value commodity, is significantly less dependent on rail freight rates than is the delivered price of iron ores; and (d) the transportation characteristics of scrap iron and steel do not compare favorably with the transportation characteristics of iron ores, and that on a per-ton basis services provided on scrap movements are considerably more costly to the railroads than are the services provided on movements of iron ores, 345 I.C.C. at 1199.

As has been stated, the format in this section will be by issue—first reasonableness, then discrimination. Before addressing these issues specifically, we will set forth and discuss the ratios of revenue-to-variable cost arrived at in both Sub-No. 6 and this investigation, for they are the foundation of the determinations made in both proceedings.

The ratios.—As we have done in this investigation, in Sub-No. 6 the Coordinator directed the Commission's Section of Cost and Valuation to take the movements submitted by the railroads and make appropriate adjustments to them. The following are the resulting ratios of rate-to-variable cost in Sub-No. 6:

356 I.C.C.

TABLE 6

*Sample average ratio of rate-to-variable cost
by origination territory*

(Ex Parte No. 270 (Sub-No. 6))

SCRAP IRON AND STEEL

	Single-car	Multiple-car	Trainload
Official.....	158	186	.....
Southern.....	151	175	.....
Western.....	154	184	.....

Iron ore

	Single-car	Multiple-car	Trainload
Official.....	114	167	202
Southern.....	112	129	.....
Western.....	79	94	129

The ratios arrived at in this investigation differ from the above in Sub-No. 6 in that they are weighted average ratios and not simple average ratios; and, therefore, there is no need for a breakdown according to type of movement—single-car, multiple-car, or trainload. In Sub-No. 6, no evidence was submitted on the volume or annual tonnages of the movements. Thus, there was no way to determine weighted averages. In this investigation we have such evidence, and, thus, the much more preferable tool of the weighted average will be used. The following are the ratios for the movements submitted in this investigation, as adjusted by our staff.²⁴

TABLE 7

Weighted average ratio of revenue-to-variable cost by origination territory

(EX PARTE NO. 319)

	Scrap iron and steel	Iron ore
Official.....	150	218
Southern.....	170	88
Western.....	162	139

²⁴At the end of this section is a complete discussion of the ratios as submitted by the railroads and as we have adjusted them. Included therein is, also, a discussion of the comments of certain parties on the respondents' ratios and our comments to them.

REASONABLENESS

As has been stated, the Coordinator found in Sub-No. 6 that the rate structure on scrap iron and steel is not unreasonably high. The Coordinator did not engage in a typical analysis and discussion of the issue of reasonableness. He stated that, a "radical change" in the rate structure on scrap iron and steel was not the goal of Sub-No. 6, 345 I.C.C. at 1182. However, the evidence presented clearly demonstrated to him that a "major overhaul" of the rate structure was not necessary, 345 I.C.C. at 1185. On the other hand, the evidence did indicate to the Coordinator that what was needed was a revision of specific rates that were either noncompensatory (below variable cost) or clearly excessive when compared to the other rates on scrap iron and steel. With respect to noncompensatory rates, the Coordinator recommended that the involved carriers review the rates and costs of the movements submitted in Sub-No. 6 which showed ratios of revenue-to-variable cost of less than 100 and examine whether up-to-date data indicate that the movements have remained non-compensatory. if so, the carriers should consider upward revisions.²⁶ As for the excessive rates, the Coordinator stated that of 392 movements considered in Sub-No. 6, 32 or 8.2 percent had ratios of 230, or, stated another way, returned revenue in excess of 230 percent of variable cost. He concluded that these ratios in excess of 230 represent "an anomaly when viewed against the norm for the transportation of scrap," 345 I.C.C. at 1185. He recommended not only a review of these movements and revisions downward where shown appropriate, but, also, that in future complaint proceedings brought before the Commission a rebuttable presumption of unreasonableness is raised if a movement on scrap iron and steel is shown to have a ratio of revenue-to-variable in excess of 230. *Id.* The Coordinator made identical findings in Sub-No. 5, *Iron Ores*. The use of the ratio of 230 is perhaps the major point in Sub-Nos. 5 and 6 to which exception was taken; particularly the rebuttable presumption aspect of it. Because in this investigation we must determine what is a "reasonable ratio" for the entire rate structure of scrap iron and steel within a territory, and not just whether a ratio on a particular movement is "anomaly when viewed against the norm," we will not deal with the exceptions on the ratio of 230 now, but, as has been stated, this issue may be addressed in other proceedings.

²⁶Of the 392 movements considered in Sub-No. 6, 40 or 10.2 percent showed ratios that were below 100.

A typical analysis in determining what are reasonable rates among other things, involves a determination of whether the traffic is moving freely under those rates. The specific questions here are whether the scrap iron and steel traffic is moving under ratios of 150 in official territory, 170 in southern territory, and 162 in western territory; and, therefore, are these ratios reasonable. There are two ways of determining this. One is to examine both freight rates and tonnage moved over a period of years, and see if they are increasing, decreasing or remaining stagnant and determine whether there is a correlation between them. Another way, is to study the relationship of freight rate to the price of scrap iron and steel and determine whether freight rates are a great part of the price of scrap and thereby possibly affecting its movement.

The Coordinator examined the movement of scrap iron and steel using the Commission's *Freight Commodity Statistics, Class 1 Railroads in the United States* as his primary source, 345 I.C.C. 1128-1156. He found, that for the United States as a whole, originated tonnage increased by 6,076,172 tons or 22.2 percent between 1966 and 1973. With the exception of southern territory, he did not comment extensively on the trends in traffic within the specific territories. In this investigation, respondents in official territory have submitted freight statistics as of 1974; and southern and western territories respondents have submitted statistics through 1975. They show both tonnage and revenue.

TABLE 8
Official territory

Year	Tons originated		Gross freight revenue	
	U.S. *	Official territory	U.S.	Official territory
1966.....	27,395,912	18,348,062	\$114,954,443	\$71,651,155
1967.....	25,469,377	16,554,122	106,602,303	65,043,502
1968.....	26,716,415	17,595,690	115,250,558	72,331,190
1969.....	29,672,820	19,386,411	129,656,470	79,912,210
1970.....	28,183,281	17,058,502	136,404,346	76,594,876
1971.....	26,608,676	16,646,745	145,752,806	83,705,141
1972.....	28,488,197	17,617,316	157,305,295	91,291,763
1973.....	33,291,872	20,321,563	192,979,038	110,163,038
1974.....	36,208,749	20,693,759	263,294,825	142,341,825

TABLE 9

Southern territory

RELATIONSHIP OF SCRAP IRON AND STEEL ORIGINATED FREIGHT AND REVENUE TO ALL CARLOAD REVENUE FREIGHT SOUTHERN DISTRICT (1)

Year	Net tons originated		Revenue (Dollars)		Percentage scrap iron and steel of all freight traffic	
	All freight traffic	Scrap iron and steel traffic	All freight traffic	Scrap iron and steel traffic	Tons originated	Revenue
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1958	237,606,706	1,316,942	1,190,783,399	6,742,725	.55	.57
1959	251,179,081	1,792,003	1,235,488,778	8,844,984	.71	.72
1960	249,691,603	1,707,032	1,184,367,149	8,164,094	.68	.69
1961	247,460,416	1,925,185	1,179,497,247	.132,732	.78	.77
1962	259,104,109	1,506,650	1,243,827,052	7,508,915	.58	.60
1963	271,768,237	1,764,331	1,280,333,160	7,743,930	.65	.60
1964	285,530,558	2,055,213	1,341,115,422	8,690,575	.72	.65
1965	297,228,786	2,095,277	1,400,859,569	9,147,926	.70	.65
1966	313,250,740	2,075,362	1,485,696,894	9,086,369	.66	.61
1967	328,671,100	2,210,672	1,517,158,101	9,140,251	.67	.60
1968	330,057,275	2,378,694	1,630,227,631	10,289,677	.72	.63
1969	340,584,027	2,816,445	1,735,412,784	12,069,392	.86	.67
1970	351,016,590	3,173,320	1,936,281,093	15,307,950	.90	.73
1971	348,096,398	3,142,747	2,124,470,392	17,656,577	.90	.83
1972	367,372,904	3,457,399	2,297,028,446	18,790,389	.94	.82
1973	380,218,211	3,967,114	2,481,492,000	21,652,000	1.04	.87
1974	387,526,942	4,806,782	2,853,184,000	33,187,000	1.24	1.16
1975	353,101,972	4,071,640	2,719,634,268	29,638,523	1.15	1.08

¹Formerly shown as Southern Region
SOURCE: I.C.C. Freight Commodity Statistics.

356 I.C.C.

TABLE 10

Western territory

STCC NO. 40 211 SCRAP IRON AND STEEL

Year	Tons originated	Gross freight revenue
1970	7,951,459	44,501,520
1971	6,819,184	44,391,088
1972	7,413,482	47,223,143
1973	9,003,195	61,164,000
1974	10,708,208	90,847,801
1975	8,539,898	78,057,751

We note fluctuations in tonnage originated and increases generally in revenue. The southern and western carriers show declines in both tonnage and revenue for 1975. The southern respondents attribute this to the economic conditions in the steel industry and the general business decline in 1975. They offer this table showing that scrap originations in the South did not drop to the same extent as the decline experienced in steel production.

TABLE 11

Statement comparing total steel production with total scrap iron tons originated by southern district class 1 railroads 1974 vs. 1975

Year	Steel production net tons	Iron and steel scrap originated tons
1974	145,720,000	4,806,782
1975	116,642,000	4,071,640
% Change	-20.0	-15.3

SOURCE: Survey of Current Business and ICC Freight Commodity Statistics.

The Coordinator made particular mention of the growth of the scrap industry in the South. The following table set out in Sub-No. 6 shows the percentage of total U.S. scrap revenue for the territories, 345 I.C.C. at 1131.

356 I.C.C.

TABLE 12

Percentage of total U.S. revenue from movements of iron and steel scrap, wastes and tailings, STCC 40211, received by eastern, southern, and western territory railroads, 1966-1973

Year	Eastern territory	Southern territory	Western territory
1966.....	62.3	7.9	29.8
1967.....	61	8.6	30.4
1968.....	62.8	8.9	28.3
1969.....	61.6	9.3	29.1
1970.....	56.2	11.2	32.6
1971.....	57.4	12.1	30.5
1972.....	58	12	30
1973.....	57.2	11.2	31.6

It can be seen that while the southern carriers are earning the smallest percentage, they are showing the largest increases. The southern railroad respondents point out that the previous table showing the relationship between scrap traffic to all traffic in southern territory shows that between 1967 and 1974 there was an increase of 18 percent in all traffic originated, however, scrap originations grew 117 percent (2.6 million tons).

The Coordinator notes, and the southern respondent stress in this investigation, that tremendous growth in scrap tonnage has not been accompanied by a similar increase in scrap's contribution to overall rail revenue in southern territory. The following tables show that the average revenue per ton on scrap increased 42 percent between 1958 and 1974; however, the average revenue per ton on all other freight traffic, other than scrap, increased 54 percent during the same period.

356 I.C.C.

TABLE 13

Average revenue per ton on scrap iron and steel originated by southern district class I railroads

Year	Originated	Revenue (dollars)	Average revenue per ton	Index
1958.....	1,316,942	6,742,725	\$5.12	100
1959.....	1,792,003	8,844,984	4.94	96
1960.....	1,707,032	8,164,094	4.78	93
1961.....	1,925,185	9,132,732	4.74	93
1962.....	1,506,650	7,508,915	4.98	97
1963.....	7,764,331	7,743,930	4.39	86
1964.....	2,055,213	8,690,575	4.23	83
1965.....	2,095,277	9,147,926	4.37	85
1966.....	2,075,362	9,086,369	4.38	86
1967.....	2,210,672	9,140,251	4.13	81
1968.....	2,378,694	10,289,677	4.33	85
1969.....	2,816,445	12,069,392	4.29	84
1970.....	3,173,320	15,307,950	4.82	94
1971.....	2,142,747	17,656,577	5.62	110
1972.....	3,457,399	18,790,389	5.43	106
1973.....	3,967,114	21,652,000	5.46	107
1974.....	4,806,782	33,187,000	6.90	135
1975.....	4,071,640	29,638,523	7.28	142

TABLE 13A

Average revenue per ton all freight traffic other than scrap iron and steel originated by southern district class I railroads

Year	Originated	Revenue (dollars)	Average revenue per ton	Index
1958.....	236,289,764	1,184,060,674	\$5.01	100
1959.....	249,387,078	1,226,643,794	4.91	98
1960.....	247,984,571	1,176,203,055	4.74	95
1961.....	245,535,231	1,170,364,515	4.76	95
1962.....	257,597,459	1,236,318,137	4.79	96
1963.....	270,003,906	1,272,589,230	4.71	94
1964.....	283,475,345	1,332,424,847	4.70	94
1965.....	295,133,509	1,391,711,643	4.71	94
1966.....	311,175,378	1,476,606,525	4.74	95
1967.....	326,460,428	1,508,017,850	4.61	92
1968.....	327,678,581	1,619,937,954	4.94	99
1969.....	337,767,582	1,773,343,392	5.25	105
1970.....	347,843,270	1,920,973,143	5.52	110
1971.....	344,953,651	2,106,813,715	6.10	122
1972.....	363,915,505	2,260,238,057	6.21	124
1973.....	376,251,097	2,459,840,000	6.54	130
1974.....	382,727,743	2,819,997,000	7.37	147
1975.....	349,030,332	2,689,995,745	7.70	154

356 I.C.C.

While the rate of growth is faster in southern territory than in official or western, it should be noted that official territory, with 57.2 percent of the total scrap revenue in the U.S. in 1973 and, 61.3 percent of the total tonnage, is the most significant region for the movement of scrap iron and steel see, 345 I.C.C. at 1131.

We stated earlier that, besides considering the movement of scrap over a period of years, we will also consider the relationship of the freight rates on scrap to its selling price in determining whether they are impeding the movement of scrap. The relationship between the freight rate and price of scrap is part of a greater question, the effect of freight rates on the demand for scrap iron and steel.

In Sub-No. 6 the Coordinator found that freight rates on scrap iron and steel have very little or no impact on the demand for scrap or the total amount of scrap sold. 345 I.C.C. at 985 and 1199. His analysis indicated that the demand for scrap is a function of cyclical variations in the iron and steel industry as opposed to the price of scrap. 345 I.C.C. at 984. As demand for steel increases, the demand for scrap increases and the price of scrap also increases. *Id.* When the demand for steel decreases, the demand for scrap and the price of scrap will also decrease. *Id.* This being the case, the Coordinator states that it logically follows that freight rates have no effect on the amount of scrap purchased. He does point out, however, that the freight rate structure can have a significant effect on where scrap is sold and the location of scrap processors. 345 I.C.C. at 985. To buttress this analysis, the Coordinator considered the relationship of freight rates to the value or price of scrap. He sets out two tables, one comparing the average price of No. 1 heavy melting with the average rail transportation charge for the entire country from 1957 through early 1974, and the other showing a comparison of the average price to the average freight rate for six railroads in official territory. They are, as follows:

356 I.C.C.

TABLE 14

Comparison of the ratio of average rail transportation to delivered price on scrap iron and steel with iron ore¹—(1957-1973)

Year	Number 1 heavy melting scrap ²	Average rail transportation charge	Ratio rail transportation charge to price
1957	\$47.10	\$4.70	10.0
1958	37.81	5.04	13.3
1959	37.69	5.01	13.3
1960	33.20	4.60	13.9
1961	36.37	4.73	13.0
1962	28.34	4.60	16.2
1963	26.89	4.57	17.0
1964	36.50	4.65	12.7
1965	34.27	4.70	13.7
1966	30.66	4.70	15.3
1967	27.63	4.69	17.0
1968	25.94	4.83	18.6
1969	30.56	4.89	16.0
1970	41.25	5.42	13.1
1971	34.46	6.14	17.8
1972	36.63	6.18	16.9
1973	57.67	6.48	11.2
Mar. 15, 1974 ³	118.50	6.88	5.8

¹In dollars and cents per gross ton.

²Composite averages at Pittsburgh, Philadelphia, and Chicago.

³Estimated.

Source: American Metal Market, Metal Statistics, 1973, Minerals Yearbook and ICC Freight Commodity Statistics.

356 I.C.C.

TABLE 15

Iron and Steel Scrap (STCC 40 211) comparison of railroad tonnages and revenue with steel production, scrap consumption and prices 1966-1973 (B&O, B&E, N&W, PC, Reading, and EL)

Year	Number of cars	Number of net tons	Gross revenue	Average revenue per ton	Rate increase on scrap iron	U.S. Steel production (net tons) (thousands)	U.S. scrap consumption (net tons) (thousands)	Average price of scrap	Freight cost as a percent of average scrap price
1966	388,988	18,498,791	\$54,974,391	\$2.97	None	134,101	91,583	\$30.66	9.7
1967	310,346	17,041,431	44,962,371	2.64	10 per GT	127,213	85,361	27.63	9.6
1968	315,669	17,589,813	57,297,501	3.26	5, max 20 per GT	131,462	87,060	25.94	12.6
1969	335,419	18,953,715	62,604,897	3.30	6	141,262	94,816	30.56	10.8
1970	301,022	16,886,540	60,469,067	3.58	6 and 8	131,514	85,559	41.25	8.7
1971	287,776	16,358,571	66,555,419	4.07	11	120,443	82,817	24.46	11.8
1972	299,276	17,169,856	72,613,872	4.23	None	133,241	94,300	36.63	11.5
1973	351,421	20,281,754	87,925,737	4.34	4 and 1.9	150,421	101,493	57.67	7.5
								110.00	3.9

*Preliminary total as of March 21, 1974, as compiled by U.S. Bureau of Mines, Dept. of Interior.

†Includes 8 percent which initially became effective in 1970 (X-267-8).

Source: AISI Annual Statistical Report—1972.

Source: U.S. Bureau of Mines, Dept. of the Interior "Mineral Industry Surveys—Iron and Steel Scrap."

Source: American Metal Market, composite price of No. 1 Heavy Melting Scrap at Philadelphia and Chicago compiled from monthly average prices.

Source: Composite data of six Eastern railroads (B&O, B&E, N&W, PC, Reading, and EL).

Source: American Metal Market, composite price of No. 1 Heavy Melting Scrap at Philadelphia, Pittsburgh and Chicago, as of May 1, 1974.

The Coordinator noted the ranges in the last columns of these tables—10 percent to 18.6 percent in the table for the entire country and 7.5 to 12.6 percent in the above table for official territory—and, based on "current economic data," it is projected that the ratio of price to freight rate for the country will be 13.9 percent in 1976. He did not address the role this plays in a determination of reasonableness, but does state that 13.9 percent is "clearly significant." See 345 I.C.C. at 991. His purpose in this exercise was to compare the rate to price ratio of scrap with that of iron ore. We will do this in the next part of this section when we deal with the issue of discrimination; we note it here, of course, because it does bear on a determination of reasonableness.

ISIS and Northwestern Steel and Wire (Northwestern) except to the Coordinator's conclusion that the demand for scrap and iron and steel is not affected by or is inelastic to changes in price and, therefore, freight rates. ISIS, viewing the price of scrap in its relation to its alleged competition with iron ore, states that the Coordinator's conclusion defies the most elementary and fundamental rules of economics. It submits that when any manufacturer has a choice of two raw materials to produce a given product, price is most certainly a determining factor. Northwestern refers to the above table showing the rate to price ratio for the country, and states that between 1960 and 1973 the price of No. 1 heavy melting scrap can be characterized as stable. It states that, during this period, the construction of the scrap-intensive electric furnaces reached substantial proportions. Northwestern further states that to go along with the stable price of scrap freight rates, increases were to some extent kept within reasonable bounds. It submits that had this not been the case, it is questionable that the construction of electric furnaces would have proceeded at the pace that it did. Hence, the inference that the price and freight rate on scrap affect its demand.

In reply to ISIS, Armco, Inland Republic and Youngstown contend that in the instance of scrap iron and steel and iron ore, there is no choice of raw materials. It refers to the discussion in Sub-No. 6 of the competitive relationship between scrap and iron ore, which will be discussed later herein. They also reiterate the Coordinator's finding that the demand for scrap is tied to steel production and not the price of scrap. In reply to Northwestern, they submit that scrap prices between 1960 and 1973 were not stable. There were jumps of 35 percent from 1 year to the next. The 1973 price was 173.8 percent of the 1960 price. The eastern 356 I.C.C.

railroads, in reply to Northwestern, state that electric furnace expansion was due to its smaller size and more limited capital investment and not because of the stability of the price of scrap. They also submit that the holddowns in general increases did not play a significant role and the rail rate to scrap price ratios between 1960 and 1973 were among the highest.

In this investigation, we have received additional, up-to-date evidence on rate-to-price ratios and the effect of freight rates on the demand for scrap.

The southern railroad respondents offer four tables comparing freight rates to the price or value of scrap. The first illustrates the volatile nature of scrap iron prices.

TABLE 16

Year	Price	Change
		Percent
1966	\$30.87	-10
1967	27.62	-10
1968	25.85	-6
1969	30.87	+19
1970	41.06	+33
1971	34.09	-17
1972	36.89	+8
1973	57.95	+57
1974	108.51	+87
1975	71.73	-34

The next table is a comparison of average freight rate in southern territory to price.

356 I.C.C.

TABLE 17

The ratio of average rail rates in southern district to prices on scrap iron and steel—(1965-1975)

SCRAP IRON OR STEEL (STCC 40 211)

Year	Composite price ¹	Average rate ¹	Rate as a percent of price
1965	34.35	\$3.18	9.3
1966	30.87	3.24	10.5
1967	27.62	3.23	11.7
1968	25.85	3.34	12.9
1969	30.87	3.42	11.1
1970	41.06	3.77	9.2
1971	34.09	4.21	12.3
1972	36.89	4.21	11.4
1973	57.95	4.63	8.0
1974	108.51	5.76	5.3
1975	71.73	6.24	8.7

¹Per long ton for No. 1 heavy melting scrap.

Average revenue per net ton converted to rate per gross ton. Based on total tons carried.

SOURCE: U. S. Department of the Interior, Bureau of Mines, Minerals Yearbook.

ICC Freight Commodity Statistics, Class 1 Railroads, Southern District, 1965-1974.

ICC Quarterly Reports of Freight Commodity Statistics, 1975.

The range here is between 5.3 and 12.9 percent. While freight rates have steadily increased, the price of scrap has, as the preceding table illustrates, fluctuated tremendously.

The third table shows the value of scrap shipments originated in southern territory. The value was calculated by multiplying the price by the net tons originated in the South. Price per net ton is used in this table as opposed to the price per long ton for No. 1 heavy melting scrap in the preceding table. Respondents point out that the 1975 statistics represent an increase in total value of 306 percent over 1965; the actual value of which is \$196,485,680.

356 I.C.C.

TABLE 18

Value of scrap iron originated by rail in the south

Year	Net tons Originated (1)	Price (NT) (2)	Total Value (1) x (2)	Index
				Percent
1965.....	2,095,277	\$30.67	\$64,262,146	100
1966.....	2,075,362	27.56	47,196,977	89
1967.....	2,210,672	24.66	54,515,172	85
1968.....	2,378,694	23.08	54,900,257	85
1969.....	2,816,445	27.5	77,621,224	121
1970.....	3,173,320	36.66	116,333,911	181
1971.....	3,142,747	30.44	95,665,219	149
1972.....	3,457,399	32.94	113,886,723	177
1973.....	3,967,114	51.74	205,258,478	319
1974.....	4,806,782	96.88	465,681,040	725
1975.....	4,071,640	64.04	260,747,826	406
Increase.....	1,976,363	33.37	196,485,680	306

We note that there seems to be no correlation between the amount of tonnage originated and the price of scrap. An increase in price does not seem to cause a decrease in tonnage; in fact, in 1974 the price of scrap was the highest for the years shown, and the tonnage originated was the highest.

The fourth and last table is a comparison of the value of scrap originated in southern territory to the freight revenue from all scrap traffic handled (not just originated). Respondents point out that even with the active changes in scrap prices, the ratio of freight charges to the value of scrap has remained at a relatively very low level.

356 I.C.C.

TABLE 19

Comparison of the value of scrap to the freight charges on scrap

Year	Total value ¹	Freight revenue ²	Freight of value
			Percent
1965.....	\$64,262,146	\$9,147,926	14
1966.....	57,196,977	9,086,369	16
1967.....	54,515,172	9,140,251	17
1968.....	54,900,257	10,289,667	19
1969.....	77,621,224	12,069,392	16
1970.....	116,333,911	15,307,950	13
1971.....	95,665,219	17,656,577	18
1972.....	113,886,723	18,790,389	16
1973.....	205,258,478	21,652,000	11
1974.....	465,681,040	33,187,000	7
1975.....	260,747,826	29,638,523	11

¹Based on tons originated.²Based on tons handled.

The eastern railroad respondents offer this very revealing table comparing average freight rates, railroad volume, composite market prices for No. 1 heavy melting scrap and domestic production statistics for raw steel for the years 1968-1975. It shows how rail tonnages and, for the most part, scrap prices vary with or are governed by the level of activity in the steelmaking industry. All of this, respondents point out, while freight rates steadily increase.

356 I.C.C.

TABLE 20

Rail rates on ferrous scrap, terminations by principal scrap hauling railroads, scrap prices, and raw steel production, by quarter, 1968-1974

Year-quarter	Average rail rate for ferrous scrap (dollars/net ton) ¹	Terminations by principal scrap hauling railroad net tons (000's) ²	Composite average price for No. 1 heavy melting scrap at Pittsburgh, Philadelphia, and Chicago (dollars/gross ton) ³	Domestic production of raw steel net tons (000's) ⁴
1968				
1st	4.29	4,014	\$30.75	36,531
2nd	4.29	4,019	25.22	37,056
3rd	4.29	3,131	23.36	28,494
4th	4.50	3,334	24.35	29,017
1969				
1st	4.50	3,967	27.22	34,399
2nd	4.50	4,022	28.34	36,309
3rd	4.50	3,642	32.66	34,309
4th	4.77	3,929	34.01	36,052
1970				
1st	4.77	3,498	43.69	33,627
2nd	4.77	3,662	42.54	34,283
3rd	4.77	3,443	41.30	32,272
4th	5.06	3,004	27.61	31,145
1971				
1st	5.06	3,477	29.54	34,793
2nd	5.06	3,949	34.22	36,976
3rd	5.06	2,763	32.51	23,394
4th	5.58	2,863	31.58	25,048

356 I.C.C.

See footnotes at end of table

Rail rates on ferrous scrap, terminations by principal scrap hauling railroads, scrap prices, and raw steel production, by quarter, 1968-1974—Continued

Year-quarter	Average rail rate for ferrous scrap (dollars/net ton) ¹	Terminations by principal scrap hauling railroad net tons (000's) ²	Composite average price for No. 1 heavy melting scrap at Pittsburgh, Philadelphia, and Chicago (dollars/gross ton) ³	Domestic production of raw steel net tons (000's) ⁴
1972				
1st	5.58	3,230	\$32.68	31,569
2nd	5.58	3,908	35.39	34,504
3rd	5.58	3,124	36.74	32,096
4th	5.58	3,584	37.72	34,933
1973				
1st	5.58	3,842	48.15	37,087
2nd	5.58	4,149	51.04	38,450
3rd	5.58	3,681	56.18	36,701
4th	5.91	4,130	75.29	28,184
1974				
1st	6.06	3,713	102.14	37,082
2nd	6.33	4,326	110.12	37,379
3rd	6.35	4,228	118.42	35,841
4th	6.35	4,780	100.62	35,191
1975				
1st	6.35	3,937	81.78	34,426
2nd	6.66	3,549	78.51	29,275
3rd	6.99	2,677	67.27	26,314
4th	7.86	3,129	62.51	26,768

356 I.C.C.

¹Source: Interstate Commerce Commission, Environmental Impact Statement, Ex Parte No. 281, p. 105 (May 5, 1973); some rates computed.
²Penn Central, Chesapeake & Ohio, Baltimore & Ohio, Norfolk & Western, and Reading-individual company data, 1968 thru 1972, 1973 thru 1975 Q.C.S. reports of cited RRs to I.C.C.
 See footnotes on following page.

¹American Metal Market.

²Source: American Iron and Steel Institute, Annual Statistical Report, table 28 (1974).

³New rate, effective November 28, 1968 (Ex Parte No. 259).

⁴New rate, effective November 18, 1969 (Ex Parte No. 262).

⁵New rate, effective November 20, 1970 (Ex Parte No. 265).

⁶New rate, effective November 12, 1971 (Ex Parte No. 267).

⁷New rate, effective August 13, 1973 (Ex Parte No. 281).

⁸New rate, effective October 1, 1973 (Ex Parte No. 299).

⁹New rate, effective March 9, 1974 (Ex Parte No. 301-A).

¹⁰New rate, effective May 1, 1974 (Ex Parte No. 303, plus Ex Parte No. 301-C).

¹¹New rate, effective June 1, 1974 (Ex Parte No. 301-D).

¹²New rate, effective April 22, 1975 (Ex Parte No. 310).

¹³New rate, effective June 20, 1975 (Ex Parte No. 313, 5 percent).

¹⁴New rate, effective October 11, 1975 (Ex Parte No. 313, 5 percent, plus 2-1/2 percent, and Ex Parte No. 305-RE).

Pursuant to part III of the format in which evidence was to be presented in this investigation, as has been described in the evidence section herein, the respondent railroads jointly presented a study by the Gellman Research Associates which addressed the question of the sensitivity of recyclable materials to changes in transportation rates. Since we have found this study's analysis of the effect of recyclables to be, for our purposes, deficient, we are not considering its conclusion in this regard, herein, in discussing scrap iron and steel. Gellman's discussion of the competitive relationship between scrap iron and steel and iron ore, however, has not been found to be without probative value, and therefore will be considered in the following part dealing with discrimination.

In his reply statement in this investigation, witness Herschel Cutler—Executive Director of ISIS—states that we should not rely on published data and statistics in determining the effect of the rate structure on the movement of scrap iron and steel. Witness Cutler, as is consistent with ISIS' position throughout Sub-No. 6 and this investigation, is considering the movement of scrap in relation to the issue of discrimination and its allegedly competitive relationship with iron ore, and not with respect to the issue of reasonableness. However, it is appropriate to note his criticisms at this time. Witness Cutler's position is simply that published data and statistics do not reveal how much scrap iron could have moved by rail had the rate structure been proper and lawful; and because it is difficult to derive a viable method for determining this, the quantitative effect of measuring the effect of rates on the movement of scrap cannot be demonstrated by historical data, but only by logical inference.

Northwestern Steel and Wire Company and Lukens Steel Company, both so-called nonintegrated producers who utilize the scrap-intensive electric furnace exclusively, argue in their reply

356 I.C.C.

statements that indeed the movement of scrap is sensitive to freight rates.

Northwestern states that due to the cooperation of the Chicago and Northwestern Railroad the rates within a 150-mile radius of its plant in Sterling, Ill., are reasonable. Without these reasonable rates, Northwestern states that it would not have been as successful as it currently is, nor would it have been in a position to expand its operations. Northwestern has had two 400-ton electric furnaces, which are the largest electric furnaces in the world. On May 1, 1976, it started operating another such furnace. Because of its expansion, Northwestern states that, it must now go beyond a 150-mile radius to obtain an adequate supply of scrap. Northwestern considers the rates on these longer movements to be unreasonable and has developed a scale of rates on movements up to 1,100 miles. It is inappropriate and impractical for us to consider and prescribe specific rates in this investigation. This is a general investigation into rate structures and not individual rates. Also, neither is there time nor a sufficient record for us to properly consider Northwestern's proposed scale.

Lukens states that no matter what the price of scrap at origin, a high freight rate will preclude the movement of it; the decision whether or not to purchase a given lot of scrap often rests directly on the freight cost. Lukens adds that under current rates, scrap tonnage is leaving the railroads in favor of motor carriage.

Discussion and conclusion.—It is apparent that the absence of extensive evidence and discussion of the shifting of recyclable traffic from rail to motor carriage, both common and private, is a great void in this record. We have found the Gellman study to be of only limited value because of its failure to consider intermodal competition. Witness Cutler is correct that statistics on the movement of scrap iron and steel by rail does not tell the story, i.e., how much could have moved by rail. In this record, there are only occasional references to shifts from rail to motor carriage. With respect to scrap iron and steel traffic, Lukens makes the above statement and there was some discussion of it when witness Robert Toia of Lukens was cross-examined.²⁶ Perhaps the most significant testimony in this regard is contained in the statement of witnesses Tori, Barthol, Leigh and Joyce of the Eastern Railroads wherein they state that the carriers in official territory are aware of the "trend toward increased trucking of scrap iron, particularly for

²⁶He indicated that 25 percent of the inbound movements of scrap to Lukens is by truck and this is usually short-haul traffic within approximately 125-mile radius.

shorter hauls." They state that they have initiated a large number of rate proposals on scrap iron and steel, 105 for the period January 1, 1975 to May 25, 1976. We could infer from the testimony of Northwestern Steel and Wire that the reason that the rates within the 150-mile radius of its plant are satisfactory or "reasonable" to Northwestern is because of the existence of motor carrier competition. While the record gives us some indication that there is more diversion of scrap traffic away from the railroads and to motor carriages, the evidence is hardly extensive, clear or conclusive. Hence, we cannot consider it to be a major factor in determining reasonableness.

The respondent railroads, on the other hand, have clearly shown through all of the above data that the movement of scrap is a function of the level of activity in the steel industry, and that while freight rates have increased steadily, the amount of tonnage carried by the railroads, as well as the price of scrap has fluctuated in accordance with steel production. The respondents' evidence in this investigation confirms the conclusion of the Coordinator that the demand for scrap is inelastic to changes in freight rates. Although the ratio of the freight rate to the price of scrap iron and steel may be as the Coordinator stated, "significant," there is no indication that it is impeding the flow of scrap traffic by rail.

It is significant to note that of the three territories, the ratio of revenue-to-variable cost in southern territory is the highest, 170, yet the South is moving substantially increasing amounts of scrap iron and steel. The rapid growth in the South noted by the Coordinator appears to be continuing.

It is our conclusion that the rate structure on scrap iron and steel in the three territories—showing ratios of revenue-to-variable cost of 150 in official, 170 in southern, and 162 in western territories—are just and reasonable.

DISCRIMINATION

In Sub-No. 6, the Coordinator did not go through a structured, step-by-step analysis in determining whether the rate structures on scrap iron and steel are being discriminated against in favor of the rate structure on iron ore. However, the Coordinator did discuss the issue of discrimination. He considered the ratios, 345 I.C.C. at 1167-1177; he made a finding on the issue of competition, 345 I.C.C. at 1157-1167; he found that the demand for scrap iron and steel is inelastic to changes in transportation rates, 345 I.C.C. at

356 I.C.C.

984-991; and he discussed the difference in the transportation characteristics of scrap iron and steel and iron ore, 345 I.C.C. at 967-978. Combining these, the result is a determination by the Coordinator that the rate structures on scrap iron and steel are not discriminatory.

The Coordinator did specifically make an ultimate finding with respect to the issue of discrimination. He based it solely on an analysis of the revenue/cost relationships arrived at in Sub-No. 6 and his conclusion was for the Nation as a whole and not for individual territories. We set out the ratios of revenue-to-variable cost earlier. For official territory, only, the Coordinator also considered the ratios of revenue-to-fully allocated costs. We note again that he used simple average ratios instead of weighted average ratios as we do in this investigation.

Recognizing that simple average ratios are imprecise, the Coordinator thought it more meaningful to compare the ratios of revenue-to-variable cost for the predominant movements of scrap iron and steel and iron ore. He found that the vast majority of scrap traffic moved as single-car shipments and the vast majority of iron ore traffic is handled in trainload shipments. The ratios in official territory were 158 for single-car shipments of scrap and 202 for trainload shipments of iron ore. In western territory, the ratios were 154 for scrap and 130 for iron ore. Because the southern territory moves a limited amount of iron ore there were no trainload shipments shown for it, thus the Coordinator made no comparison for southern territory. Combining the ratios for official and western territory, showed that trainload shipments of iron ore had a higher ratio, 169, than single-car shipments of scrap, 156.

As for the ratios of revenue-to-fully allocated cost in official territory, the Coordinator stated that the car and car-mile and dollar bases for allocating constant costs are more reliable when comparing two commodities like scrap iron and steel and iron ore which have different loading characteristics. He found the third method which is frequently used, the ton and ton-mile basis, inappropriate. The car and car-mile basis and the dollar basis both showed iron ore with higher ratios than scrap, see 345 I.C.C. at 1169 (table 179).

On this basis, the Coordinator concluded that there was no "pattern of discrimination" against scrap iron and steel, 345 I.C.C. at 1178. See also, 345 I.C.C. at 1199 (finding No. 3).

We shall proceed and follow our step-by-step analysis in determining whether the rate structure on scrap iron and steel are discriminatory.

356 I.C.C.

The ratios.—We have shown the weighted average ratios of revenue-to-variable costs arrived at from the movements submitted in this proceeding in a table at the beginning of this section. In official territory the ratio on iron ore is 218, far exceeding the ratio on scrap iron and steel which is 150. This is very significant since official territory is the major scrap iron and steel region, accounting for over half of the total tonnage moved in the United States. In southern territory the situation is reversed. The ratio on scrap iron and steel is 170, and the ratio on iron ore is a noncompensatory (below variable cost) 88. This noncompensatory ratio on iron ore in the South, however, is very suspect. In his reply statement, witness Eugene Bilz for Armco, Inland, Republic, and Youngstown attacks the accuracy of the mileage used in determining the cost for two movements in the South, Copperhill, Tenn., to Alabama City, Ala., and Copperhill, Tenn., to North Birmingham, Ala. He states that the southern railroad respondents have used too high a mileage figure which results in higher costs and lower ratios of revenue-to-variable cost. Witness Bilz recalculates the ratios using what he thinks are proper mileage figures and comes up with much higher ratios. The readjustments result in the approximately 13-percent increase in the final weighted average ratio for iron ore. This possible error casts serious doubt on the accuracy of the noncompensatory ratio of 88 that we have arrived at. Thus, while this ratio would have been of great concern to us, indications are that it is inaccurate and that the ratio on iron ore in the South is compensatory.²⁷ The ratios in western territory are closest to equality, though like southern territory, greater for scrap iron and steel—162 for scrap iron and steel, and 139 for iron ore.

Because the disparity in the ratios in official territory is favorable towards scrap iron and steel, it is unnecessary to consider further whether the rate structure on scrap iron and steel in official territory is discriminatory. However, because the disparity in the southern and western territories are favorable to iron ore, we must go on and consider whether there is a competitive relationship between scrap iron and steel, whether the disparity in rates is injurious to scrap, and, if so, whether transportation characteristics justify the disparity.

Competition.—As we have stated, the question of whether or not a competitive relationship exists between scrap iron and steel and iron ore was addressed by the Coordinator in Sub-No. 6, 345 I.C.C.

²⁷A discussion of this point raised by witness Bilz is also contained in our discussion of all revenue and cost data which appears at the end of this section.

at 1157-1167. Accepting the fact that both iron ores and scrap iron and steel provide metallic inputs to the production of steel, the Coordinator, nevertheless, concluded that "the relationship between iron ores and scrap iron and steel is, in almost all cases, complementary and not competitive. The two commodities are both metallic inputs into the steelmaking process, but they are not metallurgical substitutes," 345 I.C.C. at 1166; also Ultimate Finding No. 4, 345 I.C.C. at 1199.

The Coordinator's discussion of the issue of competition included a review of the previous Commission cases that have dealt with the issue and a summary of the pertinent evidence submitted in Sub-No. 6. Essentially, the prior cases found that scrap iron and steel competes only with what is known as pig iron and iron ore, with an iron content of greater than 90 percent; scrap was found not to compete with iron ore with an iron content of less than 73 percent. With two exceptions, the increases on scrap were not related to those on iron ore except to the extent of the limited amount of competition noted above. The exceptions were, first, in Ex Parte No. 295 (Sub-No. 1) *Increased Freight Rates and Charges, 1973*, 349 I.C.C. 250, where the Commission, in light of the then pendency of Sub-No. 6 and "to remove any possible risk that the increase would retard movements of ferrous scrap," granted a holddown in cents per gross ton on scrap that was equal in amount to the holddown on iron ore. In Ex Parte No. 310, *Increased Freight Rates and Charges, 1975*, the Commission took similar action, but then the reason was the harsh effect the Nation's economic downturn had on the recycling industry.²⁸

In an earlier part of the report the Coordinator presented a summary of the current steelmaking processes, 345 I.C.C. at 916. In the section on competition, or as he entitles it, the "relationship of scrap iron and steel and iron ores in the steelmaking process," the Coordinator restates that information in addition to a discussion of the specific evidence on competition. For our purposes, only a basic summary of the Coordinator's discussion is necessary.

There are three types of facilities or furnaces which are the most commonly used to produce steel—the open hearth furnace (OHF),

²⁸Since the issuance of the Coordinator's reports in Sub-No. 6, there have been three other general increase proceedings: Ex Parte No. 318, *Increased Freight Rates and Charges, 1976* (report unprinted); Ex Parte No. 330, *Increased Freight Rates—West and International—1976* (no report); and Ex Parte No. 336, *Increased Freight Rates and Charges—1977* (no report). Because the issues in this investigation are to a large extent dispositive of those raised in those proceedings with respect to recyclables, we held in abeyance any final decision therein pending the completion of this investigation.

the basic oxygen furnace (BOF), and the electric furnace. The OHF used to be the predominant steelmaking facility, accounting for 88.2 percent of the steel produced in the U.S. in 1960. By 1973 its use had declined so drastically that it accounted for only 26.4 percent of U.S. steel output. Substantial increases in the use of the BOF and electric furnace have corresponded with the decline of the OHF. The BOF was responsible for 3.4 percent of U.S. steel production in 1960 and 55.2 percent in 1973. The electric furnace went from 8.5 percent in 1960 to 18.4 percent in 1973.

Although, theoretically, it is possible to use one of six types of metallic charges or combination of ferrous (iron) inputs in the OHF, for all practical and economic purposes only one is widely used, a liquid blast furnace iron and solid iron and steel scrap charge. It should be explained at this point that steel companies or producers who employ the OHF and/or BOF are referred to as integrated steel producers. Integrated producers employ blast furnaces which convert crude iron ore into what is known as hot metal or, as just referred to, liquid blast furnace iron. Thus, when we refer to the use of iron ore in the OHF and BOF what is actually being used is hot metal. Nonintegrated producers are steel companies who employ electric furnaces and utilize scrap as their ferrous input, the scrap entering the furnace directly and not undergoing any change as iron ore does in the blast furnace.

Going back to the OHF, the most common charges are between 40- and 65-percent hot metal and 35- to 60-percent scrap. The average charge for all OHFs between 1965 and 1972 included 41.1 percent to 45.6-percent scrap. The Coordinator found that "While the 'most common-charge' appears to allow for significant interchangeability and thus direct competition between scrap and the product of iron ore (hot metal), this appearance is misleading." The percentage usage of scrap or hot metal in the OHF is determined by many factors including the demand for total output from the mill (furnace), the capacity of the blast furnace supplying the hot metal, and the chemical composition and physical properties of the materials used. Charges using higher proportions of hot metal generally result in faster furnace cycle and higher productivity. Because of the direct pertinence of rail rates to it, the Coordinator also names the factor of the delivered price of scrap and iron ore, and stresses that, when taken into consideration with all other factors, the delivered price of scrap appears to have only a small effect on the percentage scrap used in the OHF. The Coordinator also found that the existence of the blast furnace and its capacity to provide hot

metal is the major determinant in the proportion of scrap that will be required in the OHF. He states that in almost all cases the steel company will attempt to utilize the blast furnace to capacity and will use scrap iron and steel in the OHF as a complementary material to the available hot metal.

The BOF also uses both hot metal and scrap iron and steel. The Coordinator found, however, that the BOF is less versatile in its use of various proportions of hot metal and scrap than the OHF. Most BOFs use computers to calculate the proportions of scrap and hot metal needed to obtain a "thermally-balanced charge" for each heat. The delivered prices of iron ore and scrap are not part of the computer's calculations. The percentage of hot metal used in the BOF can theoretically range between 50 and 90, but normally the thermally-balanced charge ranges from 68-74-percent hot metal, depending on its chemical composition and temperature and on the extent to which pig iron (cooled hot metal) is used with the scrap charge. The average scrap charge in BOFs was found to be 27.8-30.1 percent. The amount of scrap used could be increased (up to 50 percent of the charge) if it is preheated and calcium or silicon carbide is added to the charge. However, generally, these methods increase costs or decrease productivity. The Coordinator found, that the small variations in scrap and hot metal usage to be essentially a function of the varying chemical characteristics of the commodities.

Unlike the OHF and the BOF, there is virtually no versatility in the electric furnace. The metallic input for all electric furnaces in the United States, according to the data in Sub-No. 6, is 96.8- to 99.7-percent scrap. There are only a very small number of electric furnaces that use other inputs. The Coordinator notes one that uses hot metal and states that it is unique because it was built to consume the output of an existing blast furnace. Scrap is not competitive with iron ore at this facility because the use of scrap would necessitate idling the blast furnace. The Coordinator also notes three electric furnaces which use what is known as direct reduction iron pellets. Although these pellets do in fact compete with scrap, the Coordinator found that neither the existing or potential competition to be significant. The reasons being that there is only one domestic source of iron ore that is suitable for direct reduction and the process consumes a great deal of natural gas, of which there is allegedly a shortage.

Having reviewed the three types of steelmaking facilities or processes, the Coordinator made the following observations and conclusions:

While real competition appears to exist between scrap and the limited amount of iron pellets with an iron content in excess of 90 percent, the relationship between iron ores and scrap iron and steel does not appear to be competitive in the short range. The capital investments in existing facilities, long-term contracts for iron ore, coal, and limestone (other raw materials used in the blast furnace) and the technological requirements of steelmaking appear to mandate operation of blast furnaces as close to capacity as possible, which will have the effect of reducing scrap consumption in years when the demand for steel is low. When demand for steel is high, as it has been in the recent past, the steel mills generally use the highest percentage of scrap possible in the steelmaking process because of the fixed size of blast furnace capacity.

In the long range, the situation also appears to be noncompetitive between the two commodities, at least in terms of known technology. Decisions as to what type of steel manufacturing plant to build depend on a variety of factors including local, State, and Federal tax laws, depletion allowances, iron ore holdings of the company making the decision, geographic markets for the finished products, types of markets involved as to the quality and category of steel to be produced, and prices and availability of raw material and other materials needed to make steel. In addition, the size of the mill to be built will generally dictate whether it will be an ore consuming BOF facility or an electric furnace facility consuming only scrap. Capacities in excess of 1.5-million annual tons of steel are needed to justify building a BOF plant. Since, as noted, these factors currently foster the development of scrap intensive electric furnace process mills, it is difficult to maintain that scrap iron and steel will be competitively disadvantaged in the long run.

*** The Coordinator must conclude *** that the relationship between iron ores and scrap iron and steel is, in almost all cases, complementary and not competitive. The two commodities are both material inputs into the steelmaking process, but they are not metallurgical substitutes.

ISIS, Northwestern Steel and Wire, and the Copperweld Corporation (another nonintegrated producer) except to this conclusion of the Coordinator.

ISIS submits that steel made from scrap is steel just as steel made from ore is steel. "Steel is steel." In order for commodities to be competitive, it argues, they need not be produced by or introduced into the same type of equipment. The test of substitutability is in the end product—the steel produced—not in the machinery which manufactures the product. Citing the example of competition in the transportation industry itself, ISIS asks, "Is there any instance where a railroad train travels down an interstate highway, or a truck travels on a railroad track?" ISIS states that, steel manufactured from iron ore in a BOF and steel manufactured from scrap in an electric furnace may be shipped to the same metal fabrication plant to be used for identical purposes. ISIS cites a number of Commission cases that allegedly stand for the propositions that (1) two commodities may be competitive though they are manufactured or produced by different methods or equipment,²⁹ and (2) two

²⁹For example, *National Veneer & Panel Mfrs.' Assn. v. Aberdeen & R. R. Co.*, 81 I.C.C. 227, 231 (1923) and *Nucor Butter Co. v. E. R. Co.*, 20 I.C.C. 174 (1911).

commodities may be competitive though they are not identical so long as they are used for the same or at least many of the same purposes.³⁰

Northwestern Steel and Wire, also asserts that the end products determine whether there is competition between scrap and iron ore. It contends that the Coordinator is fundamentally wrong in insisting that competitive relationship between scrap and ore can only be found if there are movements of both between the same points or areas. It argues that because it receives its scrap from points entirely different than those from which its competitors, the integrated producers, receive their iron ore, does not mean that there is no competition between the two commodities, and, therefore, freight rates should not be related. Northwestern asks that if there is no competition then why, in general increase proceedings, when it is trying to get holddowns based on a competitive relationship, have the integrated producers sought to show the contrary?

Copperweld interprets the Coordinator as saying that a consumer of scrap has a choice between scrap and iron ore and this choice is based on the need for higher throughput, a "thermally-balanced charge," or the prevailing costs of each source of ferrous units. From this Copperweld states that Coordinator concludes that scrap and hot metal are "interchangeable" and, therefore, complementary and not competitive.

Copperweld argues that the Coordinator overlooks the fact that Copperweld and its fellow nonintegrated producers have no choice. They employ electric furnaces which can use only scrap and compete in the market place with steel products produced by the integrated producers from iron ore. Joining with ISIS and Northwestern Steel and Wire, Copperweld also argues that since steel made from integrated and nonintegrated producers compete, scrap and iron ore compete as sources of iron units.

In reply to ISIS, the eastern railroad respondents and Armco, Inland, Republic, and Youngstown review the cases cited by ISIS and challenges ISIS' reading and application of them. Their position is essentially that, yes, commodities are competitive if they are interchangeable or substitutable. But the commodities themselves must be substitutable, the relationship between the end products they produce being irrelevant. The eastern railroads submit that ISIS has provided no authority for fixing a rate relationship on

³⁰For example, *Goldschmidt Corp. v. Pennsylvania R. Co.*, 159 I.C.C. 475 (1929); *National Cottonseed Products Assn. Inc., v. A., B. & C. R. Co.*, 256 I.C.C. 89 (1943); and *H. H. Robertson Co. v. Alabama G. S. R. Co.*, 167 I.C.C. 693 (1930).

noncompetitive raw materials because of the competition between end products. Armco, Inland, Republic, and Youngstown refer to the Coordinator's discussion wherein they say he clearly recognizes that the amounts of scrap used in the open hearth and basic oxygen furnaces are virtually fixed by factors other than freight rates.

In reply to Northwestern, the eastern railroad respondents state they cannot locate where there is a finding by the Coordinator that in order for there to be competition there must be movement between the same points. Even if there is such a finding, respondents state it was expanded upon and supplemented by the Coordinator's thorough analysis of all of the transportation conditions surrounding the movement of scrap and iron ore, 345 I.C.C. at 977-8. Armco, Inland, Republic, and Youngstown argue that the dramatic increases in the rate of use of the electric furnace, which the Coordinator notes, belie any claim that producers using them are at competitive disadvantage.

In response to Copperweld, Armco, Inland, Republic, and Youngstown respondents point out that the Coordinator never found that the commodities were complementary because they were interchangeable, but they were complementary and not competitive because of the absence of interchangeability. The eastern railroad respondents submit that inflexibility in the steelmaking furnaces, forecloses the steelmakers or, as Copperweld refers to them, consumers from having a choice between scrap and iron ore. Although there may be interchangeability between steel from the electric furnace and steel from the BOF, there is no competition between scrap and iron ore because they are not interchangeable. They cite the following passage from *American Agricultural Chemical Co. v. Aberdeen & R.R. Co.*, 225 I.C.C. 610, 628 (1937):

*** There must be sufficient similarity between [the commodities] to make them competitive in the same market and that competition must be commercially important. The purposes for which the commodities are produced and generally used, the extent of their interchangeability and their relative money and inherent values are cogent facts to be considered in determining whether there is such competition.

In this investigation, the position of the respondent railroads on the competitive relationship between scrap iron and steel iron ore is jointly expressed in the statement of the Gellman Research Associates.

Gellman's discussion and conclusion, generally, follows that of the Coordinator. They differ, however, in that Gellman points out and emphasizes the roles of the different types or grades of scrap in

steelmaking. There are three basic types of scrap—home scrap, prompt industrial scrap, and obsolete scrap. A complete discussion of them is contained in Sub-No. 6, 345 I.C.C. at 874-897. Home scrap is a byproduct of steelmaking and normally recirculates within the steelmaking plant in which it is produced or, to a lesser extent, is shipped to another plant within the same company. Rail transportation comes into play only when there are interplant movements. Home scrap is of a very high quality and requires little processing before it can be reused; all of it is recycled. Home scrap represents approximately 61 percent of all scrap consumed by the steel industry. Prompt industrial scrap is a byproduct of the primary consumers of iron and steel, fabricators, who make semifinished and finished steel products. It is also of high quality and moves from the fabricators to scrap dealers, processors, brokers or the steelmakers directly. Rail transportation is necessary to the recycling of all prompt industrial scrap and it appears that all of it is, in fact, recycled. According to the Coordinator in Sub-No. 6, it constitutes 16 percent of all scrap used, 345 I.C.C. at 876. Obsolete scrap consists of final steel and iron products that are worn out, have become damaged, or are obsolete after being used. Some of the major categories of obsolete scrap are agriculture equipment, automobiles, containers, machinery, rail transportation equipment, and ships. It is collected by processors in the vicinity of major population or industrial areas without regard to the location of steelmaking or using plants and is shipped to the plants after commercial transactions through brokers. The Coordinator states that obsolete scrap constitutes 24 percent of all scrap used. Prompt industrial scrap and obsolete scrap together are referred to as purchased scrap.

Gellman address themselves to the three steelmaking processes. They state that the small proportion of scrap used in the BOF is particularly significant in light of the fact that most of the scrap utilized is home scrap. They quote from *An Economic Analysis of the Junk Automobile Problem* (1973) by R. L. Adams for the Bureau of Mines, United States Department of the Interior which states:

*** while the BOF requires a scrap charge ranging from 27 to 30 percent of the total quantity of metallics charged, virtually none of this need be purchased on the open market.

Gellman states that when the BOF uses purchased scrap it is usually prompt industrial scrap which has a known chemical composition

and is otherwise of high quality. They quote again from the Adams article:

Another factor tending to limit demand for scrap by basic oxygen shops evolves from the fact that even scrap is purchased for the use in the BOF, only the highest quality scrap can be used in significant quantities. This is so because the reactions take place so rapidly that the chemical elements must be in correct balance in the initial metallic charge, or the entire heat of steel may be lost. There is little or no time for correction once the process is begun.

Gellman thinks that the preference for prompt industrial scrap is particularly important because of the increasing share of steel production represented by the BOF. In 1974 it was 56 percent, and thus Gellman submits obsolete scrap is excluded from approximately 56 percent of the steel market.

Acknowledging that some substitutability is possible in the OHF, Gellman offers the following table indicating that very little has, in fact, occurred. (See also Sub-No. 6, 345 I.C.C. at 931.)

TABLE 21

Proportion of scrap and hot metal used in the open hearth

Year	Scrap	Hot metal
1973.....	44.5	55.5
1972.....	45.5	54.5
1971.....	43.6	56.4
1970.....	41.1	58.9
1969.....	44.7	55.3
1968.....	43.7	56.3
1967.....	41.2	58.9
1966.....	41.1	58.9
1965.....	41.2	58.8

Source: U.S. Bureau of Mines, *Minerals Yearbook 1966-71*, Vol. I, "Metals, Minerals, and Fuel."

Gellman thinks it important to note this small amount of substitution because of the high variability of scrap prices and the capability of the OHF to make limited substitution. They state that once this furnace finds a metallic charge which is economic, they tend not to substitute scrap and hot metal for each other. There is also a tendency away from low quality obsolete scrap such as the so-called No. 2 bundles. Knowledge and discovery of the type and level of contamination is important to the technology and function of the OHF.

Turning to the electric furnace, Gellman states that they represent the largest market for obsolete scrap. The Adams article states that the growth in electric furnace production has offset the reduction in demand by "big steel" (operators of BOFs and OHFs) for No. 2 bundles.

Gellman states that electric furnaces are the biggest purchasers of obsolete scrap because they produce a good deal of alloy steel which requires many of the residual elements (contaminants) found in low quality scrap. However, although electric furnaces have long been identified with the making of stainless as well as alloy steel, they are producing increasing amounts of carbon steel. In 1969, 66 percent of steel made in them was carbon steel. Gellman thinks this trend is significant because the contaminants found in low quality scrap are not conducive to the production of carbon steel in the electric furnace just as they are not conducive to the production of carbon steels in the BOF and the OHF.

From this discussion Gellman concludes that iron ore and scrap iron and steel are not interchanged. The two commodities flow to different facilities in quantities which are determined by the steelmaking technologies existing at those facilities. As will be discussed later herein Gellman finds that the price elasticity of scrap is low. According to Gellman, this indicates a lack of competition between it and iron ore.

The more and better substitutes for a specific good, the greater its price elasticity will tend to be. Goods with few and poor substitutes *** will always tend to have low price elasticities.

Although Gellman discussed them in relation to the promising future for scrap and its improving position uninhibited by freight rates, it is pertinent here to note some of the future trends with respect to scrap iron and steel. Gellman states that electric furnaces are the fastest growing technology in iron and steel production. It is estimated that it will capture 29.5 percent of the steel market by 1985. The process known as continuous casting is gaining prominence. The Coordinator describes this process as taking raw steel and casting it directly into a semifinished form or product, 345 I.C.C. at 918. Normally, steel is poured into ingots to solidify and then rolled into a semifinished form. *Id.* Continuous casting results in the availability or production of less home scrap. Gellman states that this innovation will cause steelmakers to increase their consumption of purchased scrap. Currently continuous casting amounts for about 6.4 percent of steel production, and it is

estimated it will account for 15 percent in 1985. Lastly, there is the increasing use by scrap processors of machines known as shredders. Shredders take low quality scrap that is compacted, such as junk autos, and shred them into small pieces. Ferrous metals (iron and steel) are then separated from other element by magnets. The resulting material is far superior in quality than No. 2 bundles. Gellman states that, in fact, shredded scrap competes successfully with high quality grades of scrap, such as No. 1 heavy melting scrap and some forms of prompt industrial scrap. There are approximately 150 shredders operating in the United States today, primarily in the automobile scrap industry. Gellman contends that these technological developments will not materially affect the lack of substitutability between iron ore and scrap iron and steel.

In reply to the Gellman statement and as their fundamental position or view of the issue of competition, ISIS offers the testimony of two well-credentialed metallurgists: John F. Elliott, formerly employed by the United States Steel Corporation and the Inland Steel Company and since 1960, Professor of Metallurgy, Massachusetts Institute of Technology (hereinafter witness Elliott); and H. W. Lownie, Jr., a professional metallurgical engineer specializing in the metallurgy and economics of iron and steel, and presently Manager, Primary Operations Section, Department of Metallurgy, Columbus Laboratories, Battelle Memorial Institute, Columbus, Ohio (hereinafter witness Lownie). Reply verified statements were submitted by both and, in addition, witness Elliott was cross-examined at length. They both submit that there is competition between scrap iron and steel and iron ore. Witness Elliott's conclusion is based on a view that is broader than the Coordinator's or the railroads' Gellman; and witness Lownie takes a more technical approach.

Witness Elliott states that competition between iron ore and purchased scrap occurs at three levels:

- (a) the selection of the process by which steel is to be made in a plant,"
- (b) the daily and weekly balancing of the use of these ferrous raw materials to minimize the cost of producing steel, and
- (c) in the competition in marketing steel products produced by integrated and nonintegrated steel plants.

The choice of which kind of steelmaking process to build, (a) above, is denominated by witness Elliott as "long run competition."

"A steel plant is one of the locations where a steel company has steelmaking facilities. A particular plant can have either a BOF, OHF, or electric furnace, or a combination of them.

He states that there are two situations involving the building of facilities. First, the installation of the so-called "grass roots" plant at a location where no steel producing facilities have existed previously; and second, the increasing of the capacity of an existing integrated complex. In building a "grass roots" plant, witness Elliott states, that as a practical matter planners would make the choice between (1) a BOF complex which includes a blast furnace, and (2) an electric furnace facility. The OHF is not considered because of the high cost associated with building and operating it. The following is his view of the decision making process.

The basic oxygen system would obtain its supply of metallics for steel production from iron ore. Because of the nature of the basic oxygen processes the plant would melt its own home scrap and would not have to purchase scrap. The electric furnace installation would be dependent totally on purchased scrap for its supply of metallics. The choice between the two facilities would depend to a large degree on the productive capacity of the plant being planned, the cost and availability of a supply of good quality iron ore, and the potential supply of purchased scrap and its expected cost over a relatively long term. Other factors, such as capital costs and the cost and availability of fuels and electricity, would also be considered in the decision. It is important to note that in electric furnace steelmaking, the cost of purchased scrap usually is approximately 55 percent of the total cost of producing raw steel. The cost of hot metal is approximately 75 percent of the total cost of producing raw steel in the BOF. The cost of the iron ore processed through the blast furnace to make the hot metal for the BOF is approximately 30 percent of the total cost of producing the raw steel.

If a plant with a capacity of no more than approximately 0.75 million tons of raw steel per year were being planned, it is most probable that a modest sized electric furnace plant would be installed. The question of the relative cost of iron ore in the form of hot metal versus the cost of scrap would be moot, and the plant would have to depend on a supply of purchased scrap, whatever the price being paid. With a plant capacity in the range of 0.75 to 2 million tons of raw steel per year, the choice between BOF and an electric furnace would be strongly influenced by the cost and availability of scrap and of iron ore. If the location were in a large industrial center and the supply of scrap appeared to be plentiful and stable, the choice would be heavily weighted toward the electric furnace. If not, and a reliable supply or relatively low-cost iron ore could be obtained, the choice would be weighted towards a BOF. In

the event that a very large facility were to be installed and the scrap supply was not adequate, it would be necessary to install the blast furnace—BOF facility.

As for the second situation, the increasing of the capacity of an integrated plant, witness Elliott sees this as the installation of a steelmaking shop of a sizable capacity, i.e., 0.4 to 2.0 million tons of raw steel per year. The decision making process in this instance would be as follows.

The choice again would be between the electric furnace and one of the two basic oxygen furnaces (BOF or Q-BOP), and the competition between scrap and iron ore would have an important influence on the choice.⁴² If the cost of augmenting the supply of ore would be high and an ample supply of scrap having an expected moderate cost over the years were available, electric furnaces would probably be installed, even though the plant had excess capacity in its coke-making facilities and blast furnace. On the other hand, if the additional purchasers of scrap necessary to support the electric furnace shop would be expected to increase the local price of scrap an average of as little as a few dollars per ton over the years and a suitable supply of ore were available at a price typical of the current market, the decision most probably would be to increase the capacity of the BOFs, or to install additional units. It also would be necessary to improve the productivity of the blast furnaces by various means.

Witness Elliott notes that there has been a balanced approach in the above two situations by all of the major steel companies that now have steel producing facilities in Northern Illinois and along the southern rim of Lake Michigan in Indiana. Several new steel plants were built which rely principally on iron ore as the source of ferrous materials and use the BOF or Q-BOP for steelmaking. A short time later, a well established steel plant augmented its steel producing facilities by installing electric furnaces to melt scrap. A few years later, that same steel plant, needing a major increase in its supply of metallics, is now installing an additional blast furnace for smelting iron ore.

As for the second level of competition, (b) above, the daily and weekly balancing of scrap and iron ore to minimize the cost of producing steel, witness Elliott's position is as follows.

⁴²The Q-BOP is a new process which is very similar to the BOF. It has been installed in several steel plants in the U.S. The proportion of scrap may be several percent higher than in normal BOF operations.

There is competition between iron ore and purchased scrap in the short-term daily and weekly operations of an integrated steel plant. The oxygen steelmaking processes (BOF and Q-BOP) and the open-hearth process do have some flexibility in the proportions of scrap and hot metal in the furnace charge. That flexibility is utilized to minimize the cost of producing steel. As an example to illustrate how the steel plant can respond to the change in the cost of scrap that is purchased, let it be assumed that the plant is operating at a reasonably high level and all but one blast furnace (a small one) is in operation. If a greater output of steel is required and the price of scrap is low, the planning department can order a larger output from the electric furnaces, perhaps by operating them an extra shift or turn each week, and more scrap would be purchased to meet the extra need for raw materials. In the case that the plant had OHF's instead of electric furnaces, the percentage of scrap in them would be increased. On the other hand, if a greater output of steel is required and the price of scrap is high, the extra blast furnace would be placed in operation and the burden to the oxygen furnaces would be changed to increase the proportion of hot metal in the charge. This could be done by using more iron ore in the furnace. The scrap displaced from the oxygen furnaces would then be melted in the electric furnaces or the OHFs. Extra shifts or turns might be ordered for all steelmaking units to obtain increased capacity. In this case, the ratio of the plant's consumption of iron ore to that of purchased scrap would be increased.

This type of balancing of the use of hot metal and scrap in the steel plant takes place as the demand for steel declines as well as advances, and as the cost of purchased scrap rises and falls. The use of scrap and hot metal can be modified directly in BOF operations in response to the changing cost of scrap. This can be done by preheating the charge to increase the proportion of scrap in the charge or using ore to decrease the proportion.⁴³ Witness Elliott points out that a relatively large amount of iron ore is used in the BOF in the rest of the world, most notably Japan, where scrap is relatively expensive and in limited supply, and where the supply of home scrap is low because of extensive use of continuous casting. He states that in spite of the average amounts of scrap and hot metal used in the average BOF practice in the U.S., it is possible and practical for American steel producers to operate in the range of

⁴³Witness Elliott states that preheating is used occasionally when the full capacity of the BOF is not being used and no loss of steel output would result. And, also, when there is a limited supply of hot metal or when scrap is relatively cheap.

essentially zero to perhaps 0.45 tons of scrap per ton of raw steel produced. He also states that in spite of its serious disadvantages a number of OHF's are still being employed because of its flexibility in using scrap for hot metal and the balance it gives to a steel plant. For instance, when a blast furnace is in need of repairs and is inoperative, and the normal supply of hot metal is reduced, the scrap charge in the OHF is increased. This allows the BOF to operate with a normal supply of hot metal. Similarly, if demand for steel is available, the furnace will operate with a relatively high fraction of scrap in the charge.

On cross-examination, witness Elliott states the following which concisely describes his position on the daily and weekly competition between scrap and iron ore:

*** most integrated steel works have several types of furnaces, which permits them to change the total scrap to iron ore usage in the steel works.

So even though one has a relatively fixed amount of scrap being used in the electric furnace, one is not confined to that amount in the overall input of scrap and iron ore into the steel works.

And, one has considerably more latitude arising from the way that one handles—one plans the production of its steel plant facilities.

The ratio in the BOF is not the limiting ratio imposed on the steel works in total.

And lastly, there is (c), witness Elliott's third level of competition, the competition in marketing steel products produced by integrated and nonintegrated steel plants, or as ISIS calls it, end product competition. The integrated steel producers rely principally on iron ore for their supply of ferrous raw materials whereas, with few exceptions, the nonintegrated producers rely on purchased scrap which is melted in electric furnaces. During the period of 1965 to 1972, scrap prices were relatively low and a number of "mini-mills" were built which depended on purchased scrap melted in electric furnaces for their supply of raw steel. It is clear that in this period, the portion of the industry that depended on the scrap market for its supply of ferrous materials prospered. Conditions changed dramatically for this segment of the industry beginning in early 1973 when the price of scrap began to rise rapidly. It is expected that the cost of scrap will tend to be relatively high in the years ahead compared to that which existed prior to 1973. This means that the integrated steel producers could be favored over the nonintegrated producers because the former could set lower prices for their products in a normal market, and their profit margins would be higher when the demand for steel is high.

If there is any similarity in witness Elliott's testimony and the discussion and conclusions of the Coordinator, it is their shared view that competition between iron ore and scrap will vary depending on the state of the market for steel products. Witness Elliott states that when demand is high and every production facility is being strained to the limit as it was in 1973, there is little or no competition. The competition is strongest when the industry is operating at intermediate to moderately high production levels. When demand for steel is relatively low, as it was in 1975, the competition in the integrated steel plants diminishes. In those plants it is desired to keep the facility for producing iron ore and pig iron operating above a certain minimum level to cover the fixed costs of the facilities and to take advantage of the depletion allowance. Hence, there is a tendency to favor the use of hot metal (and iron ore) even though the cost of purchased scrap is very low. An indication of this is given by the ratio of the total consumption of hot metal to the overall use of scrap by the steel industry in the last several years as is shown in the following table, offered by witness Elliott.

TABLE 22

Hot metal and scrap consumed by steelmaking furnaces

Million tons per year

Year	Raw steel production	Hot metal	Total scrap	Hot metal scrap
1972	133.2	83.4	67.7	1.23
1973	150.8	94.4	76.4	1.24
1974	145.7	90.0	75.3	1.20
1975	116.6	74.5	57.9	1.29

The ratio is somewhat higher in 1975 when the demand for steel was depressed than it was in 1971, 1972, and 1974 when the demand was somewhat higher. Witness Elliott anticipates that the difference would be more dramatic if one were to consider the ratio of the consumption of hot metal to that of *purchased* scrap in steelmaking. However, reliable data on the use of purchased scrap are not available. If the 1975 ratio had applied in 1973, and there had been a sufficient supply of hot metal in the country, the need for purchased scrap for steelmaking in 1973 would have been reduced by approximately 8 percent or 3 million tons.

ISIS' second witness, witness Lownie thinks that the terms "complementary" and "competitive" used in Sub-No. 6 are merely labels. He submits that the relationship between ferrous scrap and iron ore is one of substitutability in the same sense as are, for instance, air travel and automobiles. The following is his position as extracted exactly from his verified statement:

In my opinion, if I were prohibited from using steel scrap as an ingredient, I or many others knowledgeable in ferrous process metallurgy could produce steel on a high-tonnage basis in sufficient quantity to satisfy our national needs. The most attractive routes that would receive my first consideration would be (1) smelting of an all-ore burden in a blast furnace, followed by steelmaking in a BOF (basic oxygen furnace) using iron ore as the coolant; and (2) direct reduction of the iron ore in the solid state, followed by steelmaking in an electric furnace using an all-sponge-iron charge. Depending upon the specifics of the other materials available to me, and assuming that iron ore were available in sufficient quantity and grades, the steel would be of quality high enough to satisfy virtually all (perhaps all) normal commercial requirements. The steel would not suffer quality-wise from the fact that I was constrained from using any scrap in its manufacture.

At the other extreme, if I were constrained from using any iron ore to make steel on a large-tonnage basis, and if I had an adequately large availability of the usual grades of ferrous scrap, I likewise could make steel without the use of iron ore. In fact, many steel foundries and many so-called "mini-steel plants" do exactly this. My first consideration would be given to the electric furnace process using an all-scrap charge. With respect to quality, my concern would be for the composition and quality of the scrap. I am confident that I can produce steel for many applications, especially structural applications, such as deep-drawing sheet, the scrap would have to be of high quality if I had no access to purer materials (such as pig iron or sponge iron derived from iron ore) to dilute any impurities in the scrap.

In addition to being able to make steel without the use of iron ore or without the use of ferrous scrap, in my opinion, I and others also can make steel using almost any combination of ferrous scrap and iron ore. This is the situation which I as a metallurgist prefer. It gives me a wider choice of alternatives. I can balance the ratios of scrap iron and iron ore (including the pig iron and sponge iron derivatives) to minimize my processing and quality problems. Furthermore, although I have minimized to this point the effects of costs and have concentrated on technology, I am aware that if both types of materials (scrap and iron ore) are available to me, I likely can produce steel on a large scale more inexpensively than if either one or the other is not available.

In summary, in my opinion, ferrous scrap and iron ore (including its derivatives) are alternative sources for the manufacturer of steel, and it is not necessarily that they be provided in any fixed ratio.

In the manufacture of steel, iron ore and ferrous scrap are competitive in the sense that (1) in most situations either can be substituted for the other over a wide range or ratios, and (2) higher use of either to make a given amount of steel forces lower use of the other.

356 I.C.C.

A number of nonintegrated steelmakers¹⁴ have filed reply verified statements in this investigation wherein they argue that scrap iron and steel and iron ore are competitive and that freight rates have a significant effect on their companies. The effect of freight rates will be discussed later. As for the issue of competition, these steel producers which utilize electric furnaces exclusively and therefore use only scrap, subscribe to witness Elliott's third level of competition, iron ore and scrap compete because integrated and nonintegrated steel producers compete in the marketing of their steel products. It is interesting to note that on cross-examination witness Robert F. Toia of the Lukens Steel Company remarked that when Lukens began operation it employed OHFs and just within the past year has phased them out. They have never used a BOF.

The last word on this issue of competition comes from the railroads in their rebuttal statements. Gellman submits that in determining whether there is competition between a recyclable and virgin commodity what is economically feasible ought to be considered and not just what is technologically possible. They state that they have consistently found that, while it may be technologically possible to substitute a recyclable for a virgin commodity, there are a variety of economic reasons for not doing so, e.g., technologies in place today, the different locations of different technologies, the demand for products derived from virgin and scrap inputs, and the quality of scrap versus virgin commodities as perceived by both producers and consumers.

Witness Lownie, they state, addresses only the issue of technological possibility and completely ignores the economic markets in which scrap and iron ore operate. Witness Elliott's statement, although more detailed, is similarly deficient according to Gellman. His reference to the low use of scrap in the BOF in Japan ignores the difference in the economic markets of the United States and Japan. Gellman submits that if steel could be economically produced in the U.S. with less scrap in the BOF, the vertically integrated steelmakers would doubtlessly find a way to do so. The fact that no substitution has taken place, indicates that, at present, it is not economically feasible.

Although offered to show the continuing growth of electric furnaces, we think it pertinent to note with respect to the issue of competition, the articles from trade publications of the steel industry submitted on rebuttal by the eastern railroads which tell of the construction of electric furnaces by integrated producers. One

¹⁴Northwestern Steel and Wire Co., Lukens Steel Company, Copperweld Corporation, Penn-Dixie Steel Corporation, Ceco Corporation, Atlantic Steel Company, and Keystone Steel & Wire.

article tells of the installation of two electric furnaces by the Jones & Laughlin Steel Corp. instead of a previously planned BOF facility. Jones & Laughlin was forced to do this in accordance with a consent order in an environmental legal action. This is particularly relevant to witness Elliott's second level of competition, the daily and weekly balancing of the use of BOFs and electric furnaces in steel plants.

Discussion and conclusion.—In essence, we have two positions on the issue of competition before us. The first view is that taken by the Coordinator and supported by the railroads and integrated steel producers. They state we must look at the competitive situation from the context of the three steelmaking furnaces individually. If we do so, they submit that, for technical and economic reasons, iron ore and scrap iron steel are used in them in fixed amounts and are, therefore, not competitive. The other view is that propounded by ISIS and the nonintegrated producers. They state that we should not look at the substitutability or interchangeability of the furnaces themselves. If we do this, they state that we will see that the same product, steel, can be made from either the ore-intensive BOF, the scrap-intensive electric furnace, or the OHF, which uses fairly equal amounts of iron ore and scrap. Thus, they submit scrap iron and steel and iron ore do compete.

The record developed on this issue is extensive, complicated and technical. However, having studied and analyzed it as carefully as possible, it is our conclusion that while there is competition between integrated steel mills and nonintegrated steel mills there is no competition between iron ore and scrap. However, viewed realistically, we are certain that this finding will not end the controversy. Accordingly, the following discussion is based on the premise that iron ore and scrap iron and steel compete.

An assumed finding on competition is not the end but rather the beginning of an inquiry into the existence of discrimination or preference and prejudice.

Injury.—We have found in the part dealing with reasonableness that in all three of the territories the current freight rates are not affecting the movement of scrap iron and steel. The movement of scrap iron and steel has been shown to be correlated to the level of activity in the steelmaking industry.

Not only has this been shown, but in the discussion on competition we have seen a number of other economic factors which bear on the question of whether scrap iron and steel is purchased and, therefore, is transported. Both the Coordinator¹⁵ and witness Elliott for ISIS indicate that when demand for steel is high

¹⁵ 345 I.C.C. at 1165.

every steel producing facility is being used to its capacity, hence demand for scrap is high and as much as possible is used. The years 1973 and 1974 were years of high steel production and a reference to the above tables displaying the tonnage originating in the three territories show increased amounts for those years. When demand for steel is low, integrated producers who use both scrap and iron ore favor the use of iron ore because of the investment they have in blast furnaces and their long-term contracts for iron ore and coal and limestone. They want to operate the blast furnaces to capacity. These factors influence the short-term, day-to-day consumption of scrap.

Long-term, there are a host of economic considerations which come into play in determining whether to build a scrap consuming electric furnace or a primarily ore consuming BOF. The Coordinator refers to local, State, and Federal tax laws, depletion allowances, iron ore holdings and the company making the decision, price and availability of raw materials, and the capacity of the plant being planned, 345 I.C.C. at 166. Witness Elliott although he stresses the prices and availability of scrap and iron ore, also mentions some of these factors.

It is apparent to us that certainly freight rates alone are not determining whether scrap is moving. Indeed, when viewed together with these other considerations they are insignificant. We have said that the ratio of the freight rate of scrap to its price may be significant, but there is no indication that it is impeding its transportation by rail. When viewed against these other influences on the consumption and transportation of scrap, the significance of this ratio is dismissed.

Throughout the statements of their witnesses and in their brief and reply brief, it is argued that freight rates affect the movement of scrap iron and steel. They offer us only allegations and no probative evidence. Moreover, we find no refutation of the conclusion that the demand and consumption of scrap is essentially controlled by the amount of steel production. Freight rates may be a factor, but we are not persuaded that it is hindering the movement of scrap.

Although the ratios in southern and western territories are higher for scrap than iron ore, there has been no showing that these ratios are injurious to the shippers of scrap. Most significantly, the southern territory, where the disparity between scrap and iron ore is the greatest, is moving scrap at a more increasing rate than the other two territories. This is incidentally coinciding with the movement of a decreasing amount of iron ore tonnage. The

following table shows that, between 1958 and 1975 the tons of iron ore originating in the South has dropped from a range of approximately 3 to 4 million to approximately 2 million tons.

TABLE 23
Traffic in iron ores, STCC 10 1, tons and ratio of that traffic to all traffic—
Southern district, 1958-1975 (1967-100)

Year	Tons originated		Percent of all freight traffic
	Index	Total	
1958	104	4,080,064	1.72
1960	114	4,479,630	1.79
1962	94	3,700,686	1.43
1963	100	3,931,275	1.45
1964	106	4,169,422	1.46
1965	106	4,176,514	1.41
1966	117	4,599,559	1.47
1967	100	3,930,982	1.20
1968	90	3,545,087	1.07
1969	97	3,803,353	1.12
1970	84	3,317,761	.95
1971	82	3,203,919	.92
1972	46	1,804,549	.49
1973	42	1,646,442	.43
1974	47	2,241,117	.38
1975	65	2,548,732	.72

Source: ICC Freight Commodity Statistics, Class I, Southern District, 1958-1974, ICC Quarterly Reports of Freight Commodity Statistics, 1975.

Having found that the higher ratios on scrap iron and steel in southern and western territories are not working an injury to the shippers of that traffic, the conclusion follows that the rate structures in those territories are not discriminatory. There is really no need to consider if the transportation characteristics of iron ore, which differ from those of scrap iron and steel, justify the higher ratios on scrap. However, to buttress our conclusion we will note one that is of particular significance. That is the comparison of the ratio of freight rate to price for scrap iron and steel with iron ore. We have two tables showing this comparison. On the following appearing in Sub-No. 6 showing a comparison for the entire country and the other submitted in this investigation by the southern railroad respondents showing a comparison only for the southern territory.¹⁶

¹⁶The parts of these tables on scrap iron and steel are already set forth herein in our discussion of reasonableness.

TABLE 24
Comparison of the ratio of average rail transportation charge to delivered price on
scrap iron and steel with iron ore — (1957-1974)

Year	Iron ore value at mine	Average rail transportation charge	Iron ore delivered price	Ratio rail transportation charge to price	Number 1 heavy melting scrap (%)	Average rail transportation charge	Ratio rail transportation charge to price
1957	\$8.31	\$2.45	\$10.76	22.8	34.7	\$4.70	10.0
1958	8.59	2.68	11.27	23.8	37.81	5.04	13.3
1959	8.69	2.76	11.45	24.1	37.69	5.01	13.3
1960	8.73	2.62	11.35	23.1	33.20	4.60	13.9
1961	8.99	2.51	11.50	21.8	36.37	4.73	13.0
1962	8.84	2.56	11.40	22.5	28.34	4.60	16.2
1963	9.22	2.52	11.74	21.5	26.89	4.57	17.0
1964	9.52	2.52	12.04	20.9	36.50	4.65	12.7
1965	9.53	2.55	12.08	21.1	34.27	4.70	13.7
1966	9.49	2.44	11.93	20.5	30.66	4.70	15.3
1967	9.42	2.46	12.38	19.9	27.63	4.69	17.0
1968	10.21	2.51	12.72	19.7	25.94	4.83	18.6
1969	10.34	2.52	12.86	19.6	30.56	4.89	16.0
1970	10.80	2.60	13.40	19.4	41.25	5.42	13.1
1971	11.55	2.95	14.50	20.3	34.46	6.14	17.8
1972	12.20	3.04	15.24	19.9	36.63	6.18	16.9
1973	12.80	3.27	16.07	20.3	57.67	6.48	11.2
March 15, 1974					118.50	6.88	5.8

¹⁷In dollar and cents per gross ton.

¹⁸Composite averages at Pittsburgh, Philadelphia, and Chicago.

¹⁹Estimated

Source: American Metal Market, Metal Statistics, 1973, Minerals Yearbook and ICC Freight Commodity Statistics

TABLE 24A

Comparison of the ratio of average rail rates in southern district to prices on scrap iron and steel with iron ore—1965-1975

Year	Scrap iron or steel (STCC 40 211)				Iron ore, crude (STCC 10 1)			
	Composite price	Average rate	Rate as a percent of price	Average value	Average rate	Average value	Rate as a percent of price	Average rate
1965	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
1966	834.35	83.18	9.3	9.3	9.53	9.53	17.4	17.4
1967	30.87	3.24	10.5	10.5	9.49	9.49	17.3	17.3
1968	27.62	3.23	11.7	11.7	9.92	9.92	16.8	16.8
1969	25.85	3.34	12.9	12.9	10.21	10.21	16.2	16.2
1970	30.87	3.42	11.1	11.1	10.34	10.34	16.4	16.4
1971	41.06	3.77	9.2	9.2	10.80	10.80	18.0	18.0
1972	34.09	4.21	12.3	12.3	11.55	11.55	18.8	18.8
1973	36.89	4.21	11.4	11.4	12.20	12.20	16.6	16.6
1974	57.95	4.63	8.0	8.0	12.84	12.84	23.8	23.8
1975	108.51	5.76	5.3	5.3	16.34	16.34	24.1	24.1
	71.73	6.24	8.7	8.7	19.74	19.74	21.7	21.7

¹Per long ton for No. 1 heavy melting scrap.

²Per long ton of domestic usable ore l.b. mines, excluding byproduct ore.

³Average revenue per net ton converted to rate per gross ton. Based on total tons carried.

Source: U.S. Department of Interior, Bureau of Mines, Minerals Yearbook, ICC Freight Commodity Statistics, Class I Railroads, Southern District, 1965-1974, ICC Quarterly Reports of Freight Commodity Statistics, 1975.

As can be seen, the ratios of freight rate to price is higher for iron ore than scrap iron and steel. For the country, the range is between 5.8 and 18.6 for scrap and 19.4 and 24.1 for iron ore. For the South, the range is between 8.7 and 12.9 for scrap, and 16.2 and 24.1, again, for iron ore.

As we have already shown, the weighted average ratio of revenue-to-variable cost for iron ore is higher in official territory than the ratio on scrap iron and steel. Therefore, it is our final conclusion and determination that summing competition that the rate structures on scrap iron and steel in all three major territories are not unjustly discriminatory.

Environmental impact.—We have determined that the freight rate structures on scrap iron and steel are just, reasonable, and nondiscriminatory. In accordance with section 204, which directs us to comply with the National Environmental Policy Act of 1969, we must consider the effects of these determinations on the environment. This has been done in our final environmental impact statement. Therein an economic analysis was conducted similar to that engaged in by Gellman. Because the concern here is the effect of railroad freight rates on the environment and not whether those rates are reasonable or discriminatory, the deficiencies we found in the Gellman study are of no consequence in this instance. Like Gellman, in the final environmental statement it was found that demand for scrap is virtually unresponsive to price and the consumption of scrap is inelastic to changes in transportation charges. Viewing this within the context of the various environmental aspects of both the scrap and steelmaking industries, we have reached the conclusion that the freight rates on scrap iron and steel do not have a significant effect on the environment. Thus, our findings that the rate structure on scrap iron and steel are just, reasonable, and nondiscriminatory will not result in a significant effect on the environment.

Concluding remarks.—The southern railroad respondents spend a great deal of time discussing the issue of interterminal and intraterminal or cross-town switching charges on scrap and their noncompensatory levels. Scrap iron switched is 25 percent of southern's total scrap iron originations. They submit that when switching losses are considered with its line-haul scrap iron traffic, the ratio of revenue-to-variable cost is lower. In its submission southern showed a ratio of 162. With switching movements included, the ratio is 144.9. Since these cross-town switching movements are intrastate, they have been eliminated from

consideration in this investigation and a discussion of them is unnecessary.

Also, we have stated in the beginning of this section that we would not deal in this report with all of the exceptions filed in Sub-No. 6.

DISCUSSION OF REVENUE AND COST DATA AND RATIOS OF REVENUE-TO-VARIABLE COST FOR SCRAP IRON AND STEEL AND IRON ORE

Respondents' revenue-variable cost ratios.—The table below was developed from data introduced by the Eastern Railroads, Southern Freight Association, and the Western Railroads. The number of movements shown includes both inter- and intrastate traffic.

TABLE 25

Average ratio of revenue-to-variable cost

STCC virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 1 Iron ore.....	201	34	109	20	151	42
<i>Recyclable commodities</i>						
40 211 Iron or steel scrap.....	156	108	171	281	176	180

Averages reflect weighted average ratio of revenue-to-variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted to witness Hattery of Western Railroad Association.

Comparison of respondents revenue-variable cost ratios.—The ratio for iron or steel scrap is higher than the ratio for iron ore in the South and West. The difference in the West is 24 percentage points while the difference in the South is much greater (171 percent vs. 109 percent).

On the other hand, in the East the ratio for iron ore is substantially higher than the ratio for iron or steel scrap (201 percent vs. 156 percent).

Opposing Shipper comments.—The Institute for Scrap Iron and Steel (ISIS) takes issue with the submission of the Southern Freight Association (SFA) and the Western Railroad Association (WRA) on specific points:

356 I.C.C.

1. ISIS maintains that combining the expense of nine railroads to apply Rail Form A for the southern railroads distorts any cost study of portions of the total traffic. Without determining each carrier's participation in the movement and the application of individual carrier unit costs, there is no way the proper costs for such traffic can be determined. ISIS then proceeds to point out some of the distortions. For example, L&N originated 61.6 percent of the iron ore in carloads in the Southern Region in 1975, yet had only 19.7 percent of the total carloads used in the Rail Form A. Since the origin switching cost for L&N in the year 1973 was 113.1 percent of the 1973 Region IV Rail Form A average, and L&N's Train Supplies and Expenses unit cost was 117.5 percent of the 1973 regional average, weighting only 19.7 percent of the total cost with the expense of L&N understates the cost.

Similarly, the Southern Railway System (SRS) originated 41.8 percent of the iron and steel scrap traffic included in the sample, yet the regional terminal costs for SRS are below the regional average (Train Supplies and Expenses are only 61.6 percent of the regional average), this has the effect of overstating costs on iron and steel scrap traffic. ISIS cites the decision of division 2 of the Commission in *I. & S. docket No. 8998, Coal—Southwestern Western Truck Line, and Central Territories* (decided January 9, 1976) which condemned the use of unweighted composite costs:

This procedure would be appropriate if all of the rates of all of the railroads were being considered in total. However, in the instance proceeding we are concerned with specific individual rates applicable to one commodity between certain specified points. Respondents' average costs are of little value in determining the reasonableness of these individual rates.

Respondent's method of averaging the cost also gives no effect to each railroad's participation in the traffic, but assumes that all of the railroads participate equally in each movement. (Page 35)

ISIS asserts that while the information was available to affect the proper weighting of unit costs, such information as specific routing, miles and interchange points, the southern railroads as well as the East and West failed to utilize this specific information and instead used regional costs.

ISIS notes that SFA makes no adjustments in its cost study for multiple-car movements, while a large number of cars included in that traffic and cost study originate in movements of five or more cars. This omission on the part of SFA causes a distortion of costs.

356 I.C.C.

2. ISIS cites the absence of properly weighted summaries in the exhibit of witness James F. Harrity of Western Railroads. The lack of such summaries precludes the derivation of regional revenue-cost relationship for any and all commodities. Since these summaries only present the results of cost computations on a line-by-line basis, an analysis of these results is not possible or feasible.

Supporting shipper comments.—Armco Steel Corporation, Inland Steel Company, Republic Steel Corporation, and Youngstown Sheet and Tube Company (Armco Group) make reference to the cost study presented on their behalf, for movements of iron ore in 1973 which was submitted in a verified statement in Ex Parte No. 270 (Sub-No. 5), *Investigation of Railroad Freight Rate Structure—Iron Ore*. This study consisted of costs for all movements of iron ore in 1973 to each steel plant of the four above-named companies. The results showed that revenue exceeded variable cost by 74 percent. In that same statement, the revenues were shown at the Ex Parte No. 305 level and costs were updated on an April 1974, level. These comparisons showed that revenues exceeded variable costs by 93 percent. In the report and order of the Coordinator in Ex Parte No. 270 (Sub-No. 5) the method employed in this study was found "generally acceptable in developing an overall revenue-to-variable cost ratio for traffic moving to various facilities for the four companies."

Armco Group develops a comparison of rates and costs using the previously cited 1973 study and updating revenues and costs to the October 1, 1975, level. Appendix A of their reply statement (Reply Statement No. 22) is a detailed description of how the average revenues for 1973 were updated to October 1975; up and including both parts of the Ex Parte No. 313 increases. Appendix A shows a revenue increase of 40.5 percent from the average 1973 level to October 1, 1975. In the 1973 study, Armco Group used 1971 Rail Form A costs updated to 1973. For this study, Armco Group employed 1973 Rail Form A costs, as prepared and released by the Cost Finding Section of the Interstate Commerce Commission,³⁷ for all movements on which territorial costs were applied. Armco Group used Rail Form A costs for individual railroads—those railroads that were the principal carriers of iron ore to the mills studied.

Armco Group updates costs by region, using ratios developed by the procedure recommended in ICC Statement No. 2-58, *supra*. These ratios are used to update costs from 1973 to October 1975.

³⁷ *Rail Carload Cost Scales*, 1973, Statement No. IC1-73.

The resultant comparison of revenue to cost as of October 1, 1975 (table 3, p. 6, R.S. No. 22) shows a ratio of revenue-to-variable expense of 193 percent. This ratio is higher than those previously shown by Armco Group in Ex Parte No. 270 (Sub-No. 5), because revenues are increased by 40.5 percent to reflect ex parte increases up to October 1, 1975, and the update ratios used to update costs to that level only average 28 percent for the three territories.

In general, Armco Group finds the results of the eastern railroads to be quite similar to theirs. The analysis of all iron ore traffic submitted and costed out by the eastern railroads yields a ratio of revenue-to-variable cost of 180 percent, while the Armco Group shows a ratio of 193 percent.

However, Armco Group takes exceptions to some differences in the results of individual movements. Eastern railroad's results for movement of iron ore show ratios of revenue-to-variable cost of 138 percent and 141 percent for iron ore from Toledo, Ohio, to Ashland, Ky., via the B&O-C&O, a total of 349 miles. A third movement of iron ore from Toledo to Ashland via the PC and the C&O for a distance of 259 miles shows a ratio of revenue-to-variable cost of 196 percent. This is an example of varied results according to the route of movement. Operating under the assumption that these movements terminate at the plant of Armco Steel in Ashland, Ky., Armco Group references a 1973 traffic study at that plant which shows that only 9.4 percent of the Toledo-Ashland traffic in iron ore travelled via the B&O-C&O route, and that 80 percent travelled from Toledo to Ashland in single-line service on the C&O for a distance of 253 miles. A revenue-cost comparison for the latter route was not included in the movements selected for study by the eastern railroads. The ratio of revenue-to-variable cost would certainly be higher than the 196 percent shown for the PC-C&O route since it is shorter by 6 miles and would involve no interchange cost. For this reason, the eastern railroad exhibit is deficient and the ratios of 138 percent and 141 percent should not be considered.

Armco Group takes issue with SFA's application of unadjusted (emphasis added) 1974 Southern Region unit costs, updated to October 1, 1975, to iron ore traffic. The Armco Group alleges that this does not reflect the actual economies involved in moving multiple-car shipments of iron ore. As an example of this, Armco Group cites their 1973 study which showed that switching of iron ore at Alabama City, Ala. only required about 25 percent of the switching service required on average rail traffic.

Specifically, Armco Group criticizes the cost developed by SFA for the movements from Copperhill, Tenn., to Alabama City, Ala. Southern Railroad's appendix 2, sheet 2, shows a rate-variable cost ratio of 68.1 percent. For a movement from Copperhill to North Birmingham, Ala., the same ratio is 76.2 percent and for movements of STCC No. 1011320, a ratio of 83.8 percent is shown. This is so, even though other lower-tonnage movements in this commodity group show ratios as high as 326 percent. The problem is one of mileage. These movements, by their routing, show mileages in excess of 700 miles, whereas the traffic short-line distances are much less than that. The traffic route distance from Copperhill to Alabama City is 216 miles, or less than one-third the distance used in SFA's study. The Armco Group states that such excesses in total mileage cause a serious overstatement of costs.

The Armco Group recalculates the costs for movements of iron ore from Copperhill, Tenn., to the two previously mentioned destinations in Alabama; Alabama City and North Birmingham. The unit costs employed were those used in its verified statement. However, instead of using distances of 774 and 712 miles, respectively, to the two destinations, Armco Group uses the mileage in the traffic for the movement from Copperhill to Alabama City, 216 miles, and adds the mileage from Alabama City to North Birmingham via Willington, Ala., to arrive at a total of 261 miles from the Copperhill-North Birmingham movement. The cost computations using these mileages yield ratios of revenue to variable cost of 155 percent for the Copperhill-Alabama City movement (vs. the 68.1 percent shown by SFA) and 148 percent for the Copperhill-North Birmingham movement (vs. 76.2 percent shown by SFA).

Based on these results, Armco Group then recalculates the weighted average ratio of revenue-to-variable costs for STCC to 1011320, iron agglomerates, and separately for iron ore, STCC No. 10 1. The weighted average ratio of revenue-to-variable-cost for STCC No. 1011320, iron agglomerates, is revised upward from 83.8 percent to 169.0 percent and for all iron ore traffic, STCC No. 10 1, upward from 108.9 percent to 112 percent. The Armco Group alleges that these changes are solely from the mileage revision made to the Copperhill-Alabama City and Copperhill-North Birmingham movements of iron ore and do not correct the overstatement of costs due to the failure of SFA to adjust costs downward for multi-car movements of iron ore.

356 I.C.C.

Discussions and conclusions relative to shipper comments.—ISIS and Armco Group present several points, each is discussed separately.

1. ISIS contends that respondents' use of territorial Rail Form A unit costs distorts their cost study. It would be preferable to compute Rail Form A unit costs on an individual railroad basis. However, while it is true that individual Rail Form A costs are more accurate than territorial costs for costing out specific movements, territorial Rail Form A costs do provide a good approximation of the cost of service for traffic in a given region. In the absence of individual carrier costs, territorial costs are acceptable.

2. ISIS and Armco Group cite the failure of SFA to adjust costs for multiple-car movements. It is true that there are economies inherent in the transportation of multiple-car movements, and where the evidence of record indicates that a movement is a multiple-car shipment, reductions in cost should be made. The Commission's adjusted revenue-variable cost ratios reflect these adjustments.

3. ISIS cites the absence of summaries in the statement of witness Harrity of western railroads. It is true that the western railroads' presentation of results are only on a line-by-line basis (movement-by-movement). The lack of statistics enabling us to develop weighted averages of the results, is a major shortcoming of western railroads' summary. The presentation of revenue-cost comparisons in this manner makes analysis extremely difficult. Results should have been summarized for each major commodity or commodity group listed in the Commission's orders and the appropriate comparisons should have been made between the competing or potentially competitive recyclable and virgin commodities. In an effort to make some use of the western railroads' data, the Commission has developed simple average data for the appropriate commodities.

4. The Armco Group questions the submission of the eastern railroads and Southern Freight Association concerning data on particular movements:

a. Armco Group maintains that the routing for the movement of iron ore from Toledo, Ohio, to Ashland, Ky., is incorrect which overstates costs. We agree that, if this traffic moves predominantly single-line via C&O as Armco Group maintains, the ratios shown by the eastern railroads would be understated.

b. Armco Group asserts that the mileage for movements of iron ore from Copperhill, Tenn., to Alabama City and North Birmingham, Ala., are vastly overstated, resulting in overstated costs and understated revenue-variable cost ratios.

356 I.C.C.

With reference to items a and b above, the following comments apply. The costs and revenue-variable cost ratios shown in the Commission's results are based on the evidence of record. The submission of respondents are based on 1975 traffic and are costed out based on actual routing of the traffic. To the extent that such submissions do not reflect actual operating conditions, these submissions are in error. However, in the absence of absolute knowledge with regard to the movements mentioned above, the Commission's results remain based on the evidence submitted by respondents.

Serious question about these movements (item b above) make the ratios on iron ore in the South suspect. These movements generate the greatest amount of tonnage. If indeed the mileage is less than introduced, the ratio would be higher for iron in the southern territory, as alleged by Armco Group.

5. Armco Group refers to its study submitted in Ex Parte No. 270 (Sub-No. 5), *supra*, which was found by the Commission to be "generally acceptable." The procedures employed by Armco Group to update the results of that study in this proceeding are also acceptable. The single deficiency of any possible consequence in the Armco Group's study is that it is based on 1973 traffic, while the data submitted by respondents is based on 1975 traffic. Armco Group maintains that the results of its updated study are comparable with the overall results of the eastern carriers.

Since the vast majority of the steel plants of these four steel companies (Armco Group) are in the East, it is reasonable to compare the ratio for the East developed from the study made by the Armco Group to the results of respondents and the Commission. Armco Group's ratio of revenue-to-variable cost of 193 percent is reasonably close to the ratio of 201 and 218 percent shown by respondents and the Commission.

356 I.C.C.

TABLE 26

*Commission's adjustment of respondents' revenue-variable cost ratios*AVERAGE RATIO OF REVENUE-TO-VARIABLE COST (PERCENT)¹

STCC virgin commodities	East		West		South	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 1 - Iron Ore.....	218	19	88	9	139	16
<i>Recyclable commodities</i>						
40 211 - Iron or steel scrap.....	150	70	170	147	162	111

¹Based on interstate movements only.

Comparison of Commission's revenue-variable cost ratios.—The ratio for the recyclable commodity, iron or steel scrap is significantly lower than the ratio for the virgin commodity, iron ore, in the East, and higher in the South and West. However, while the difference in the ratios is great in the South, 82 percentage points (170 vs. 88 percent), the difference in the West is only 23 percentage points (162 vs. 139 percent).

Comparison of Commission's results with respondent's results.—There are no significant differences in the Commission's results and those of the respondent railroads. Differences in the ratios are not of sufficient magnitude to alter comparative findings. However, it should be noted that for each of the two commodities studied in this group, the number of movements included by the Commission was significantly less than the number costed out by respondents. This is because the Commission's results are based on only interstate movements.

In summary, the following table best illustrates the comparison between revenue-to-variable cost ratios for virgin commodities and recyclable commodities.

356 I.C.C.

TABLE 27

Average ratios of revenue-to-variable cost (percent)

Virgin	East		South		West	
	Respond- ents	Commis- sion	Respond- ents	Commis- sion	Respond- ents	Commis- sion
10 1 - Iron ore	201	218	109	88	151	139
<i>Recyclable</i>						
40 211 - Iron or steel scrap--	156	150	171	170	176	162

BLAST FURNACE, OPEN HEARTH, ROLLING MILL OR COKE OVEN PRO-
DUCTS, NEC STCC No. 33 119 AND FLY ASH. (STCC No. 33 119 10)

In our table I listing recyclables and potentially competing virgin natural resource materials, STCC No. 33 119, has been paired with iron ore, STCC No. 10 1.

The major commodities under STCC No. 33 119 are:

33 119 10	Fly Ash
33 119 40	Flue Dust
33 119 45	Mill Cinder or Mill Scale, Iron or Steel

Fly ash.—Under no circumstances does fly ash compete with iron ore. Fly ash is a light, powdery substance resulting from the burning of pulverized coal or residual fuel oil in large power plants of industries or electric utilities. The utilities are the primary source of fly ash which is used primarily in making cement. It is a filler or extender and helps produce a concrete mixture which is hard and waterproof and tends to resist breaking down under stress created by water. To a lesser extent, it is used in the making of asphalt or in road construction. According to our final environmental impact statement, fly ash competes with gravel; however, fly ash is unsuccessful in that competition.¹⁸ Since fly ash was not paired with gravel and no evidence has been received from the parties on this competitive relationship or the effects of freight rates on such relationship, our analysis will be directed to the question of whether the rate structures on fly ash are reasonable.

In making our cost adjustments and therefore altering the ratios of revenue-to-variable cost submitted by the railroads, we have

¹⁸FEIS, p. 4-150

computed only one ratio for the entire STCC group No. 33 119. We do not have a separate ratio for fly ash. However, the submissions of the respondents in official and southern territory do contain separate average revenue/cost ratios for fly ash. These ratios are 112 in official territory and 164.9 in southern territory. No separate average ratio is shown for western territory.

In submitting the trends in tonnage moved over the years, the respondents also treated STCC No. 33 119 as a group. Thus, no separate evidence is of record concerning trends in the movement of fly ash and the effects of the general increases on such movements. However, the respondents in all three territories present identical testimony with regard to the present rates on fly ash. In *Fly Ash, Chicago and Trenton, Mich., to Official Points*, 292 I.C.C. 349 (1954), the Commission prescribed rates on fly ash based on 9 1/2 percent of docket No. 28300, class 100 scale, for various mileage blocks. These rates were later converted to commodity column rates which are the normal rates on fly ash today. There are some specific commodity rates which reflect a relationship to first class of less than 9 1/2 percent. Respondents state that, because of the difference in the measure of the general increases applicable to the commodity column rates and the class rate scales, the present rates on fly ash are even less than 9 1/2 percent of first class today. This indicates that fly ash is presently awarded favorable rates, and together with the above ratios, which do not appear excessive, is sufficient to warrant a finding that rate structures on fly ash in official, southern, and western territories are just and reasonable.

As for the environmental effect of this decision, we state in our final impact statement that, if rail transportation had an effect on the use of fly ash, the primary negative impact would be its accumulation of ashes as solid waste. It is impossible to assess the magnitude or importance of the accumulation of fly ash, but any impact attributable to freight rates is likely to be insignificant.

Flue dust and mill scale.—Flue dust is an extremely light material captured in the air emission control systems of the steel industry. Mill scale is a low value material made up of shavings, clippings, flakings, et cetera from various stages of the steelmaking and rolling process. Both commodities contain a high percentage of iron and are generally used in one of two processes. The first is the sintering process where they are fused with iron ore fines and coke breeze to make a porous, clinker-like material called iron sinter. The sinter is broken into smaller pieces and fed directly into blast furnaces. As described in the section on scrap iron and steel, blast furnaces

356 I.C.C.

convert iron ore into a liquid substance known as hot metal which is used along with scrap iron and steel as the basic raw materials for the making of steel. The second process is called ore beneficiation. There flue dust and mill scale are combined with ore fines to make ore pellets. The eastern railroad respondents specifically tell us that flue dust may be substituted for iron ore in the making of iron sinter. It is apparent from the submissions of the other respondents and it is explicitly stated in our final environmental impact statement that mill scale is also substitutable with iron ore in the making of iron sinter.

Flue dust and mill scale have other minor uses among which are, like fly ash, as extenders or fillers in the making of cement. This is why these commodities are all grouped together under STCC No. 33 119.

Again because of the grouping together of all of the commodities in STCC No. 33 119, we have not calculated specific average ratios of revenue-to-variable cost for flue dust and mill scale. Nor do we have specific evidence as to the trends in the movement of this traffic. However, from the statements by the respondent railroads and, as indicated in our final environmental impact statement, it is clear that freight rates play virtually no role in the recycling of these commodities. Flue dust and mill scale are processed in sintering plants which are located right at the steel plants where these commodities are generated. Thus, there is virtually no shipment by rail of either commodity. Only when flue dust or mill scale is sought to be moved from one plant to another of the same company is transportation involved. According to our impact statement, if the shipping distance for intracompany moves is too great to be economical, then they will be sold to an appropriate nearby company. Only rarely are flue dust and mill scale left unrecycled. Thus no need appears to further discuss the ratios of revenue-to-variable cost submitted by respondents and make comparisons with iron ore.

The record shows that flue dust and mill scale are moving freely without any impediment by rail freight rates; thus we find the rate structures for these commodities to be just, reasonable, and nondiscriminatory.

Because transportation cost will not influence the use of these commodities, no environmental impacts will result from the level of freight rates.

ALUMINUM SCRAP AND RESIDUES, MISCELLANEOUS NONFERROUS METALS RESIDUES AND SCRAP, AND ASHES AND CRUDE AND CALCINATED BAUXITE ORES (STCC NOS. 40 214, 33 342, 33 398, AND 40 1, 10511 AND 10513)

The following is a discussion of the evidence presented for the virgin commodities crude and calcinated (alumina), bauxite ores, and the recyclable or recycled materials consisting of aluminum scrap and residues, miscellaneous nonferrous metals and residues and scrap, and ashes. These commodities have been listed as potentially competitive commodities in the Commission's orders in this proceeding.

We will first discuss the collection, production, and markets for these materials.

General.—The aluminum industry consists of primary producers which principally manufacture aluminum from alumina, and secondary smelters which refine aluminum from aluminum scrap. Scrap aluminum is divided into the same categories as iron and steel scrap. New scrap consists of two subcategories. Home scrap produced from internal primary aluminum production processes, consists of drosses, skimmings, and slag of known purity. It is generally recycled within the plant therefore there is no measurable transportation involved. However, prompt industrial scrap which is a byproduct of fabrication operations, accounts for 75 percent of the scrap purchased by secondary smelters. It is in the form of borings and turnings that occur in machining operations, clippings, forging, sheet, and other products. It is also a high quality scrap with known impurities which is sold to dealers and it is not transported back to primary producers. New scrap is available in large and uniform lots and two-thirds of the new scrap is recycled within the facility while the remainder is forwarded to secondary smelters and nonintegrated fabricators. Drosses and skimmings essentially are residues from the smelting and remelting process and have a relative low aluminum content (between 10 and 30 percent) and value. While most drosses and skimmings are recycled within a plant some move from primary producers and large integrated facilities to residue producers where they are concentrated to a 70-percent aluminum content before they can be recycled in smelting furnaces to recover the aluminum for reuse.

Lastly, there is the category of obsolete scrap. This consists of discarded and dismantled finished products (junked cars and airplanes, aluminum foil, cans, and household products) which have served their useful purpose. The highest percentage of aluminum

recovery is from aircraft, electric power, automotive and truck engines, and durable products. The lowest percentage of recovery is from construction, building, consumer durables, and some containers. There is no recovery at present of aluminum used in paint, chemicals, deoxidation of steel, and packages.

*Collection.*³⁹—Scrap is gathered by collectors who accumulate the various metals until they have a truckload. Then they haul the scrap to a dealer (or scrap processor) who buys the entire load and sorts it into various metals. Dealers also acquire scrap from industrial accounts such as government agencies, aircraft firms, and railroads.

Upon arrival at the scrap yards, the scrap metal is segregated by type and alloy for several reasons. This is an important step because contaminants, such as zinc or stainless steel can ruin a batch of melted aluminum. In addition, the dealer pays the transportation cost to the smelter which only pays for the aluminum scrap which remains after it has been further sorted and cleaned at its facilities. Lastly, sorting is important because of the high competition between scrap dealers and sales hinge on personal contacts with customers (smelters), and a dealer's reputation for providing scrap of a certain represented alloy and free of contaminants.

One particular facet of collection is in the area of aluminum cans. Major primary aluminum manufacturers, such as the Aluminum Can Company of America (Alcoa) and Reynolds Metal Corporation (Reynolds), have established numerous reclamations centers throughout the United States where individuals and volunteer organizations which have collected aluminum cans can bring this scrap. The collectors are paid 15 cents a pound for the cans. For economical shipment, the cans are then compacted into bales, shredded in hammer mills into small chips, or crushed and blown into freight cars. They are later melted in furnaces and recycled. It is estimated by the Aluminum Association Incorporated (AAI), that in 1975, 164 million pounds of aluminum cans were returned to recycling centers. This represented a 59-percent increase over 1974.

Consumers of aluminum scrap can be divided into the following four major categories: (1) secondary smelters; (2) primary producers and fabricators; (3) foundries and miscellaneous manufacturers; and (4) chemical plants. Secondary smelters accounted for about 75

³⁹The following discussion of the collection and processing of scrap is based on data from the Bureau of Mines, *Impact of Technology on the Commercial Secondary Aluminum Industry* (1970); Bureau of Mines, *Mineral Facts and Problems* (1970 and 1975); Bureau of Mines, *Minerals Yearbook, Vol. I, Metals, Minerals, and Fuel* (1973); Final Environmental Impact Statement, Ex Parte No. 319, Gordon, R. L., et al. *Effective Systems of Scrap Utilization: Copper, Aluminum and Nickel*, prepared for the Bureau of Mines (1972), referred to hereafter as the Gordon Study; and the submissions of the parties.

percent of the scrap consumed from 1959 through 1968.⁴⁰ Much of this was consumed in the production of castings.

Processing of obsolete scrap.—Sheet scrap, extruded material and castings are usually baled into bundles about 3 feet square and 6 feet long for ease in handling and transporting. Borings and turnings (if they are clean and of sufficient purity), are compacted into briquettes for transportation. Some dealers even operate sweat furnaces where scrap of high iron content is sweated until the aluminum melts and separates from the iron. It is then gathered and formed into ingots. This allows the dealer to ship a higher quality of aluminum and save transportation costs.

Secondary aluminum smelters purchase approximately 70 percent of the total annual supply of aluminum scrap.⁴¹ About 89 secondary aluminum smelters producing alloy ingots are located throughout the United States primarily close to industrial centers. Eighty-five percent of the total scrap purchased by secondary smelters is from mill products (new scrap) and 15 percent from castings. The scrap is segregated into four classes:⁴² (1) sheet and castings; (2) clippings and other solids; (3) boring and turnings; and (4) residues (dross, slag, and skimmings), and sweated pig. Not all smelters can process all four classes of scrap because the processes and equipment to refine each are different.⁴³

The scrap is then put into a reverberatory or rotary furnace and melted, fluxed, and skimmed. It is generally formed into ingots but in some instances where the secondary smelter has the facilities, hot metal is transported directly to the fabricator.

The following table shows the components of aluminum supply.

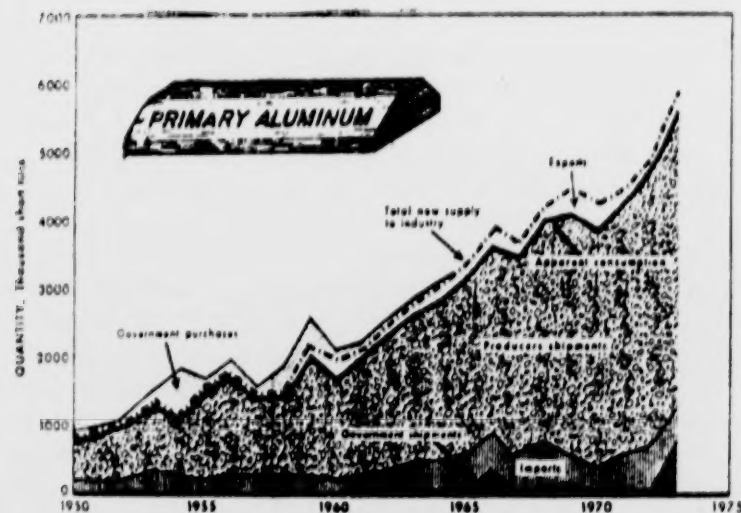
⁴⁰*Mineral Facts and Problems*, 1970, *supra*, p. 449.

⁴¹The Gordon Study, page 152.

⁴²*Impact of Technology on the Commercial Secondary Aluminum Industry*, U.S. Department of Interior, Bureau of Mines, page 6 (1970).

⁴³To process sheet and castings the scrap is hand picked of visible contaminants (zinc, magnesium, and iron). It is then fragmented into fist size pieces in a high-speed hammer mill and magnetic separators then remove any remaining iron. Clippings are put through a crusher. Borings and turnings are waste products of machining and drilling and are generally contaminated with cutting oil. The pieces of scrap are crushed and oil, water, and other contaminating organic compounds are removed by gas-oil fixed rotary dryers, screened to remove fines (which are sold for explosive or pyrotechnic purposes) and then a magnet removes any iron which remains. Residues which consist of drosses (oxidized aluminum that forms on molten aluminum), skimmings and slag, and sweated pig, are processed by either the wet or dry method. The dry method which is generally used for residue refining, crushes the scrap, screens it, removes fines, uses a magnet to remove iron and then screens it again. In the wet method, the scrap is put into a long tumbling drum, and a sheet of water passing through the drum washes the residue and carries away all of the flux (salts used to purify alumina) and keeps it from oxidizing. The remainder is then screened dried and put through a magnetic separator.

TABLE 28



—Components of domestic supply and distribution of primary aluminum.

Source: *Minerals Yearbook*, 1973, *supra*, p. 143.

The following chart shows the consumption of aluminum scrap from the years 1946 through 1974.

TABLE 29

Aluminum scrap consumption reported (Short tons/gross weight basics)

Year	Total	Smelters	Primary producers ¹	Other ²
1946.....	344,000	238,000	100,000	6,000
1947.....	411,070	312,087	90,009	8,974
1948.....	324,495	217,666	100,454	6,375
1949.....	199,039	128,472	65,602	4,965
1950.....	273,192	192,047	68,316	12,829
1951.....	332,296	232,339	80,463	19,494
1952.....	347,730	255,083	77,939	14,708
1953.....	413,333	276,279	116,011	21,043
1954.....	350,515	239,069	91,446	20,000
1955.....	427,045	313,879	86,739	26,427
1956.....	439,343	331,811	88,754	18,778
1957.....	463,000	345,000	94,000	24,000
1958.....	375,564	275,762	77,282	22,520
1959.....	475,964	384,506	62,917	28,541
1960.....	441,479	353,889	54,366	33,224

See footnotes at end of table.

356 I.C.C.

Aluminum scrap consumption reported (Short tons/gross weight basics)—Continued

Year	Total	Smelters	Primary producers ¹	Other ²
1961.....	498,116	331,705	44,572	121,839
1962.....	594,873	442,168	36,520	116,185
1963.....	647,489	493,168	44,885	109,436
1964.....	712,251	538,992	58,928	114,331
1965.....	816,620	579,844	94,985	141,791
1966.....	896,334	638,757	125,487	132,090
1967.....	882,795	617,145	122,987	142,663
1968.....	1,015,070	699,289	152,176	163,605
1969.....	1,056,546	708,298	196,857	151,391
1970.....	972,533	650,327	153,247	168,959
1971.....	1,005,000	639,909	170,755	194,114
1972.....	1,152,000	706,484	205,231	240,718
1973.....	1,262,000	736,819	212,545	313,025
1974.....	1,206,000	630,223	238,958	336,880

¹For 1951-53, includes small amounts reported consumed by nonintegrated fabricators.

²Most consumption of sweated pig apparently not reported by "others" prior to 1961.

Source: Aluminum Association, *Aluminum Statistical Review*, 1974, p. 19, New York, N.Y. (1975).

Products.—Smelters produce a varied product line, but most concentrate on producing a few basic alloys. The most common alloy produced by independent smelters is alloy 380 and variations. It is the most widely used of the general purpose casting alloys.⁴⁴ Overall in 1973, 762,096 short tons of secondary aluminum alloys were produced compared to 680,064 short tons in 1972.

Hardeners (which are used to introduce precise amounts of particular metals into a melt to meet predetermined specifications) are also produced. These are sold principally to primary producers for use in metals that are going to be extruded and are seldom used in alloys that are to be die cast. Some recovered secondary aluminum is also used for destructive purposes (deoxidizing steel, catalysts, explosives). The following table shows the dissipative purposes of aluminum for the year 1965.

⁴⁴*Minerals Yearbook*, 1973, *supra*, p. 142.

356 I.C.C.

TABLE 30

Aluminum used for dissipative purposes in 1965

(THOUSAND POUNDS)

Use	Ingot, shot, granules		Scrap (gross weight)	Dross and skimmings (recover- able weight)	Total
	Primary metal	Secondary metal			
Steel deoxidizing	58,928	60,647	-----	10,624	-----
Reduction of ferroalloys	4,146	-----	10,720	-----	-----
Steel alloying	9,373	1,027	-----	-----	-----
Steel coating and similar processes ..	14,266	-----	-----	-----	169,731
Zinc-base alloys	21,857	18,571	8,093	-----	48,521
Copper-base alloys	2,995	517	541	-----	4,053
Anhydrous aluminum chloride and catalysts	14,885	7,880	-----	-----	-----
Other ¹	27,765	1,830	11,561	9,022	72,943
Total, all uses	154,215	90,472	30,915	19,646	295,248

¹Includes some estimation.

Includes magnesium-base alloys, other nonaluminum-base alloys, explosives, pyrotechnics, exothermic applications, and miscellaneous chemicals.

Source: U.S. Department of Commerce, Business and Defense Services Administration.

The table shows that 30.6 percent of all aluminum used for dissipative purposes was from secondary metal, and this does not include direct purchases of scrap or residue for dissipative purposes.

The following table shows the recovery of aluminum in the United States both from old and new scrap.

TABLE 31

Recovery of old and new scrap

(SHORT TONS)

Year	Recovery from old scrap	Recovery from new scrap	Percent of old to new scrap recovered
1969	148,205	752,625	20
1970	145,576	635,843	23
1971	167,030	648,138	26
1972	188,594	755,762	25
1973	196,514	841,966	23

Source: *Minerals Yearbook, 1973, supra*, p. 143.

Consumers of recovered aluminum.—The demand for secondary aluminum is primarily from foundries which need alloys to manufacture castings. Foundries fall into three main groups: (1) die casting; (2) permanent mold casting which manufacture diesel and automotive pistons; and (3) sand casting foundries.

The secondary smelters market 90 percent of their output to and are clearly dependent on the casting industry. The castings industry obtains between 70 and 80 percent of its total aluminum requirements from the smelters and relies on the primary producers for the remainder.

Prompt industrial scrap, such as sheet or clippings which have been carefully segregated in a fabricating plant, can be remelted for reuse in alloys of similar composition to produce wrought aluminum products. This is the material desired by nonintegrated fabricators and primary producers. Only 30 percent of aluminum scrap is of this quality. In many cases the fabricator will return the scrap to the primary producer and will in return receive primary aluminum, paying the difference in price between the two commodities.

Processing of aluminum from ore.—Bauxite is the basic material used in the production of aluminum. It is mined domestically primarily in Arkansas, with the remainder found in Alabama and Georgia. However, only 10 percent of the Nation's requirements for bauxite are produced domestically, 90 percent is imported from Jamaica, Surinam, and Guyana, which produce bauxite of between 40 and 50 percent aluminum content.

The production of aluminum ingots from bauxite is a two-step process. First, alumina (aluminum oxide), also known as calcined or activated bauxite ore, is formed. This product is then reduced to aluminum ingot. In the first step, powdered bauxite goes through the Bayer process to remove impurities and form a white granular powder, alumina, which is the basic raw material for the reduction plant or smelter. The following tables show the plants in the United States where bauxite is manufactured into alumina, their capacities, and the amount of bauxite consumed.

356 I.C.C.

TABLE 32

Capacities of domestic alumina plants, December 31, 1973¹

(THOUSAND SHORT TONS PER YEAR)

Company and plant	Capacity
Aluminum Co. of America:	
Bauxite, Ark.....	1,375
Mobile, Ala.....	1,025
Point Comfort, Tex.....	1,350
Total.....	2,750
Martin Marietta Aluminum, Inc.:	
St. Croix, V.I.....	360
Kaiser Aluminum & Chemical Corp.:	
Baton Rouge, La.....	1,025
Gramercy, La.....	800
Total.....	1,825
Ormet Corp.:	
Burnside, La.....	600
Reynolds Metals Co.:	
Hurricane Creek, Ark.....	840
Corpus Christi, Tex.....	1,385
Total.....	2,225
Grand Total.....	7,760

Capacity may vary depending upon the bauxite used.
 Estimate by the Bureau of Mines.

Source: *Minerals Yearbook*, 1973, *supra*, p. 192.

TABLE 33

Crude and processed bauxite consumed in the United States

(THOUSAND LONG TONS, DRY EQUIVALENT)

Type	Domestic origin	Foreign origin	Total ¹
1972			
Crude and dried.....	1,766	12,838	14,602
Calcined and activated.....	185	588	772
Total.....	1,950	13,425	15,375

356 I.C.C.

Crude and processed bauxite consumed in the United States—Continued

(THOUSAND LONG TONS, DRY EQUIVALENT—CONTINUED)

Type	Domestic origin	Foreign origin	Total ¹
1973			
Crude and dried.....	1,748	13,995	15,743
Calcined and activated.....	226	673	899
Total.....	1,974	14,668	16,642

¹Data may not add to totals shown because of independent rounding.Source: *Minerals Yearbook*, 1973, *supra*, p. 193.

It takes 2 tons of bauxite to produce one ton of alumina. It then takes 2 tons of alumina to produce 1 ton of aluminum.⁴⁵ The ingots or billets are subsequently manufactured by fabricators into mill products, rods, bars, sheets and plates which require a relatively low percentage of impurities. Because the primary aluminum product is energy intensive (requiring large amounts of electricity for production), the manufacturing facilities are located near hydroelectric power plants or natural gas, coal or lignite fields.

Most bauxite and alumina is imported through ports on the Gulf of Mexico and moves to nearby points where most of the bauxite is processed into aluminum. There is also a trend toward building processing plants near the bauxite mines.⁴⁶

More than 90 percent of the bauxite consumed in the United States is used to make aluminum. Less than 10 percent is applied to other uses, such as abrasive, refractory, and chemical production. It is also used in the production of high alumina content cement, in

⁴⁵To make 1 ton of aluminum, 0.25 tons of coal, 0.125 tons of fuel oil, 0.5 tons of soda, and 0.0625 tons of lime are also needed.

The various components in the aluminum process have the following costs:

	Value
4 tons of bauxite.....	\$20-\$30
2 tons of alumina.....	100-130
3/4 ton carbon.....	35-95
1 ton aluminum metal.....	520

Source: *Mineral Facts and Problems*, 1970, *supra*, page 451.

⁴⁶*Mineral Facts and Problems*, 1970, *supra*. In 1968, more than one-half of the bauxite mined was processed into alumina or aluminum in the country of origin. The bauxite mined in the United States is also generally refined into alumina near the mines.

356 I.C.C.

low density insulating materials, as an absorbent or catalyst by the oil industry, and as a flux in making steel alloys. The transportation industry is a major consumer of aluminum, accounting for nearly 20 percent of total consumption. It is also used in components in automobiles, buildings and other construction projects, electrical and communication industries, and durable consumer goods.

Ashes.—Ashes have been paired with calcinated or activated bauxite ore. They are composed primarily of coal ashes or cinders. Coal ash originates as mineral matter associated with coal-forming materials and inorganic substances. In mining, mineral matter may be added inadvertently or intentionally in order to alter the ashing properties of the coal. The mineral matter may take many forms including shales, kaolins, sulfides, carbonates, chlorides, and others. The ash remains as an inorganic residue when coal is burned in a furnace at temperatures between 2,500° and 3,100° F. Coal ash takes the form of fly ash, dry bottom boiler ash, wet bottom boiler slag, cyclone boiler slag, and cinders. Fly ash represents approximately 65 percent of the total residues generated by electric utility companies in burning coal, the remaining 35 percent is composed of bottom ashes, slag and cinders.

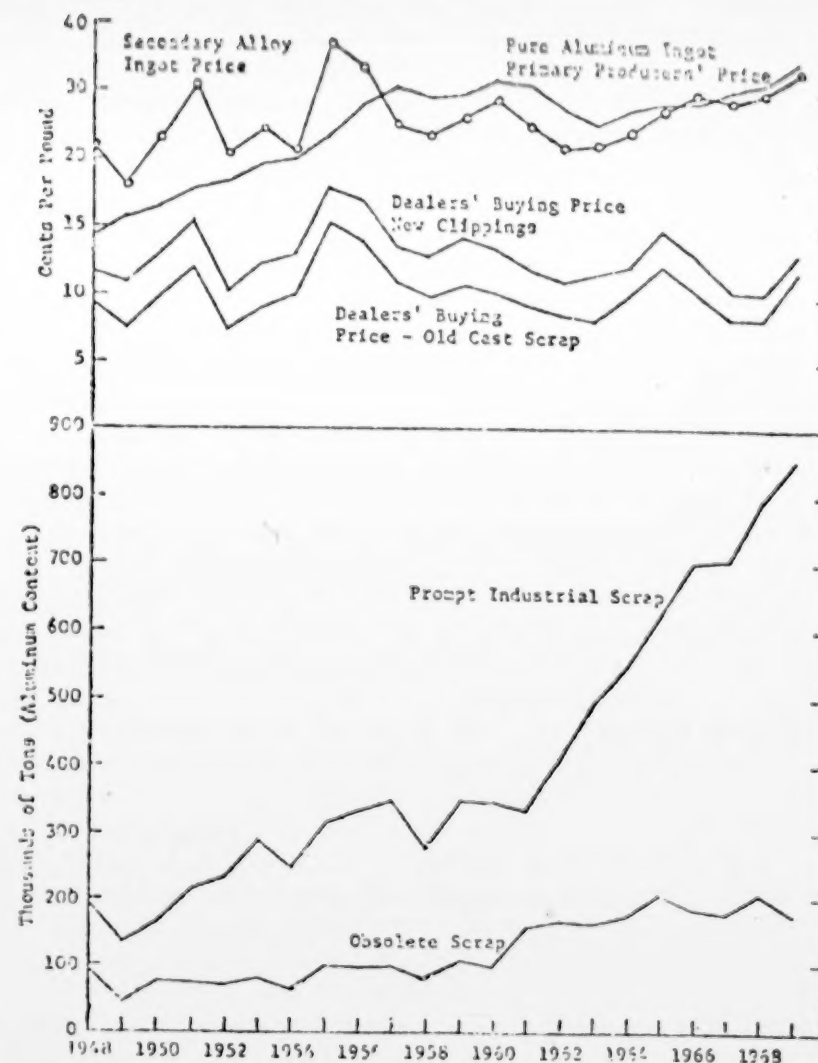
Fly ash is purchased from utility companies by dealers primarily in the business of marketing ash products.⁴⁷ The ash is tested to determine its value as an additive or for other uses. Coal ashes are used as a cover and compaction medium in waste disposal landfills, in highway and airport runway construction, for land reclamation projects in strip-mining areas, in agriculture and as a constituent of concrete.

Price.—The average annual buying prices offered by scrap merchants for "old cast scrap" and "new scrap clippings" and the tonnage for the period 1948-1968 are shown in the table below. The price differential is generally 2 cents a pound. Average annual prices for secondary aluminum ingot (alloy No. 380) and primary aluminum ingot (99 percent or more pure aluminum) are also shown.

⁴⁷The rate structures on fly ash are not considered herein but have already been dealt with in a preceding section.

TABLE 34

Annual buying prices



Source: The Gordon Study, p. 156.
356 I.C.C.

PART I

RATE STRUCTURE, MOVEMENTS, AND RATIOS OF REVENUE TO
VARIABLE COSTS OF COMMODITIES

The eastern railroads contend that the rates on nonferrous metal residues are generally the same as those on nonferrous metal scrap. Within the official territory the rates are based on general-commodity column mileage scales. In cases where there are heavy volume repetitive movements between major points of origin and destination, as in zinc dross, residue or skimmings, the eastern railroads contend that incentive rates have been established. These rates provide for a minimum weight of 100,000 pounds between points in the official territory. In instances where this produces inadequate revenues, it is alleged that minimum weights have been increased to 120,000 pounds per car.

There are also a number of point-to-point commodity rates to meet truck competition based on capacity loading in equipment. Rates on these commodities when shipped for recycling, are exempt from the 7-percent increase under Ex Parte No. 310.

The eastern carriers contend that in 1963 at NARI's request, a full line of rates on all nonferrous metal scrap were established subject to carload minimums of 40,000, 60,000, and 80,000 pounds, respectively. In 1969, rates based on minimum weights of 100,000-120,000 pounds were established on brass, bronze, or copper, residues or scrap, and a limited number of other nonferrous scrap. Where there is intermodal or market-related competition, point-to-point rates on a single-car basis have been established.

In the East, nonferrous scrap (STCC Nos. 40-212, 40-213, 40-214, and 40-219), moves in significant quantities by rail and truck from manufacturing plants where generated, and from dealer yards, refineries, and foundries. When these commodities are moving to remelting furnaces, they qualify for the lower level of rates accorded recyclables. Most of the eastern railroads' repetitive movements represented home scrap moving between plants of the same company.

The Southern Railway states that except for some specific commodity rates, the present basis of rates on nonferrous scrap metals in southern territory, are commodity rates minimums 40,000, 60,000, and 80,000 pounds, respectively. On April 10, 1962, 35,000-pound truck competitive rates were established on scrap aluminum, having value for remelting purposes only, lower rates for excess

356 I.C.C.

loads.⁴⁸ In 1962 as a truck competitive measure, rates based on minimum weights of 40,000 and 80,000 pounds were established. A further revision on aluminum scrap and nonferrous metals was made in October 1963, when rates were established based on minima of 40,000, 60,000, and 80,000 pounds.⁴⁹

Aluminum smelting residues within southern territory move on commodity rates minima 40,000, 80,000, and 100,000 pounds. From southern territory to official, most aluminum smelting residues move on commodity rates with similar minima. These rates were established over 15 years ago.

No tariff authority on aluminum scrap or residue was presented by Western roads.

Virgin materials.—At the present time, the only points in the South producing and shipping bauxite ore are Andersonville, Ga., and Eufaula and White Oak, Ala. This traffic moves primarily on point-to-point rates generally reflecting the destination territory basis.

Lastly, bauxite imported through southern ports moves on single car rates; multiple-car rates minimum 900 tons per shipment, which are 74 percent of the single-car rates; and multiple-car rates, minimum 1,800 tons, based on 85 percent of the 900 ton-multiple car-rates.

At one time bauxite ore was subject to a minimum weight of 60,000 pounds. However, higher minima were established in 1969; boxcars at 80,000 pounds, gondolas or open hopper cars at 90 percent of marked capacity but not less than 110,000 pounds, and covered hopper cars also at 90 percent marked capacity but not less than 130,000 pounds.

In the West, there are relatively few movements of crude bauxite ore in comparison to movements of alumina. There are relatively few movements of scrap and bauxite between the same points. There are no published scales of rates applicable to bauxite ore in the West.

The rates on alumina in the West are single-car rates based on mileage scales. The rates have been in effect since 1965 without change with the exception of applicable general increases.

There is a substantial domestic movement of alumina within the Southwest. Heavy tonnages are also imported through north Pacific

⁴⁸The 35,000 pound rates were 23.7 percent of docket No. 28300 first class rate at Ex Parte No. 212 level and the excess rate was 83 percent of 35,000 pound rate at Ex Parte No. 212 level.

⁴⁹In 1964, the items were consolidated under the heading of "scrap metals, non-ferrous" and "scrap metal, non-ferrous, having value for remelting or reclamation purposes only", but the exception ratings remained the same.

124d

coast ports for consumption by aluminum manufacturers in Oregon and Washington. Rates in the Pacific northwest (in existence since the late 1960's) are based on minimum tenders of six carloads. Shipments move in bulk in covered hoppers. There is no relationship between multiple-car rates and the single-car rates in the Pacific northwest or the southwest.

Alumina accounted for less than 1/25 of 1 percent of ConRail's total tonnage in 1975.

In the southern territory, the movement of ashes, which includes coal cinders also, is insignificant. The only rates available are class rates, generally class 20. The Southern Railway provides an example of one such movement in 1975 of under 30 cars of wood ashes from Coosa Pines, Ala., to Covington, Ala., a distance of 649 short-line miles, on a class 20 rate of 158 cents per 100 pounds at the Ex Parte No. 313 level.

The Norfolk & Western selected no movement examples of ashes. It originated only 50 tons of this commodity in 1975.

The Southern Railway originated 794 tons of ashes. Its representative movements accounted for 75 percent of this traffic.

The Chessie states that ashes do not compete with calcinated or activated bauxite ores. Bauxite it is alleged is a mixed mineral or natural aggregate of aluminum-bearing minerals which is used in the production of aluminum oxide (alumina) and in the manufacture of refractories, abrasives, cement, plastics, et cetera. Ash, it is contended, is not used in the production of these commodities.

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the TEA, SFA and the WRA. The number of movements shown includes both inter- and intrastate traffic.

356 I.C.C.

TABLE 35

Average ratio of revenue to variable cost¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
VIRGIN COMMODITIES						
10 511 - Crude bauxite ore	186	11	188	34	160	12
10 513 - Calcinated or activated bauxite ore	132	4	178	20	184	22
RECYCLABLE COMMODITIES						
33 342 - Aluminum residues	285	10	223	10	232	19
40 214 - Aluminum or alloy scrap	187	30	190	12	187	28
33 398 - Miscellaneous non-ferrous metal residues ..	339	1	-----	0	227	5
40 1 - Ashes	-----	0	124	1	226	5

¹Averages reflect weighted average ratio of revenue-to-variable cost as taken from statements for the eastern railroads and SFA and reflect simple average ratio computed from evidence submitted by Witness Harrity of the WRA.

Comparison of respondents revenue-variable-cost ratios.—

1. *Aluminum residues (33 342) vs. crude bauxite ores (10 511).*—Railroad cost evidence shows higher ratios of revenue to variable cost for the recyclable commodities, aluminum residues. The disparity is greatest in the East, where the ratio of revenue to variable cost exceeds that of crude bauxite ore by 285 to 186 percent.

2. *Aluminum or alloy scrap (40 214) vs. crude bauxite ores (10 511) and calcinated or activated bauxite ores (10 513).*—Railroad evidence shows the results to be approximately equal, especially in the South, where the 190-percent ratio of aluminum or alloy scrap closely approximates those of its competing virgin commodities.

In the East, the ratio of 187 percent for aluminum scrap approximately equals the 186 percent shown for crude bauxite ore, but is well above the 132 percent shown for calcinated bauxite ores. This is due in part to the fact that the Eastern results include only four movements for calcinated or activated bauxite ores (10 513) and the weighted average ratio of revenue to variable cost would be heavily weighted in favor of that movement from Norfolk, Va. to Massena, N.Y. This movement, which has a ratio of revenue to variable cost of 128 percent, moved approximately 63 percent of the carloads included in that study of that commodity. Any weighted results shown would thus be heavily influenced by the results for that one movement.

356 I.C.C.

3. *Miscellaneous nonferrous metal residues (33 398) vs. calcinated or activated bauxite ores (10 513).*—Eastern railroads show a ratio of revenue to variable cost of 339 percent for miscellaneous nonferrous metal residues (33 398), which is far higher than the same ratios for its virgin counterpart. This ratio is based on only one movement representing 28 carloads per year. Thus, it is difficult to make meaningful comparisons. Because there are no movements of miscellaneous nonferrous metal residues in the South, no comparison can be made.

The results for the West show that the ratio for the recyclable commodity is higher than for the virgin commodity; showing a ratio of revenue to variable cost of 227 percent for the recyclable commodity as opposed to 184 percent for the virgin commodity.

Commission's adjustment of respondent's revenue-variable-cost ratios.—The following table displays our results for the movements presented, after intrastate, paper and duplicate movements were eliminated. Movements were presented on the basis of those originating in that territory.

TABLE 36

Average ratio of revenue to variable cost (percent)

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 511 - Crude bauxite ore--	172	8	160	29	152	13
10 513 - Calcinated or activated bauxite ore	128	3	170	14	180	21
<i>Recyclable commodities</i>						
33 342 - Aluminum residues--	431	9	227	11	213	15
40 214 - Aluminum or alloy scrap	177	33	184	11	161	17
33 398 - Miscellaneous nonferrous metal residues	319	2	-----	0	173	4
40 1 - Ashes	343	2	118	1	183	3

Comparison of Commission's Revenue-Variable Cost Ratios.—

1. *Aluminum residues (33 342) v. crude bauxite ores (10 511)*—Results for the two commodities show consistently higher

356 I.C.C.

ratios for the recyclable commodity. The weighted average ratio of 431 percent in the East for aluminum residues, is discussed below in the comparison of our results with those of respondent. It is heavily weighted by one movement which has a ratio of revenue to variable cost of 582 percent. However, even the simple average ratio for those same movements is 250 percent, which is still much higher than the 172-percent ratio shown for crude bauxite ore in the East.

2. *Aluminum or alloy scrap (40 214) v. crude bauxite ores (10 511) and calcinated or activated bauxite ores (10 513).*—The disparity evident in the comparison shown above is not evident here. The results for aluminum or alloy scrap are roughly comparable to those for the two above-named virgin commodities.

In the East, the weighted average ratio of revenue to variable cost is 177 percent for aluminum residues. This exceeds the 128 percent shown for calcinated or activated bauxite ores by a wide margin. However, the results in the East for that commodity consist of data for only three movements, and such results are heavily weighted by the movement of calcinated or activated bauxite ores from Norfolk, Va. to Massena, N.Y., mentioned in the section on the respondents' results.

In the South, the ratio for the recyclable commodity is somewhat higher (184 percent) than for its competing virgin commodities. The weighted average for virgin commodities would be between 160 to 170 percent. In the West, the comparisons show approximately equal results.

3. *Miscellaneous nonferrous metal residues (33 398) v. calcinated or activated bauxite ores (10 513).*—Comparisons of the results for these two commodities are made difficult by the fact that there are so few movements of the recyclable commodity. The revenue to variable cost ratios are much higher in the East for the recyclable commodity, miscellaneous nonferrous residues, but this comparison is based on the results for only two movements for the recyclable commodity and three for the virgin commodity. Since there are no movements of miscellaneous nonferrous residues in the South, no comparison can be made in that region. In the West, the results show similar ratios for both the virgin commodity and its competing recyclable commodity.

4. *Respondents show no movements of ashes (40 1) in the East.*—The Commission's results for ashes in the East show two movements with extremely high ratios of 347 and 339 percent. Both movements originated in the East but were submitted by the Western railroads. The shift of these two movements also accounts for the difference in

356 I.C.C.

the ratios for ashes in the West, where the respondents ratio of 226 percent is higher than the Commission's ratio of 183 percent.

Comparison of Commission's results with respondents' results.—Our results are, for the most part, similar to those shown by the respondent railroads. In general the Commission ratios of revenue to variable cost are consistently lower than those shown by the railroads, but the comparisons between the virgin and recyclable commodities are the same with only one exception. That one exception is miscellaneous nonferrous metal residues in the West.

For that commodity, Commission results show a weighted average ratio of revenue to variable cost of 173 percent and a simple average of 174 percent, while the simple average of the western railroad's data is 227 percent. This disparity follows through in comparisons between the virgin and recyclable commodities in comparison (3) above. Commission results are about equal between the virgin and recyclable commodity, while the railroad results show the ratios to be higher for the recyclable commodity. This is due to the fact that the western railroad's results for miscellaneous nonferrous metal residues include a movement which originates in Gary, Ind. and terminates in Newport, Minn. This movement has a ratio of revenue to variable cost of 369 percent. However, since this movement is originated by an eastern railroad, the results for this movement are shown in our results for the official territory and are reflected in the ratios for the East. Disregarding this movement, the railroad results for that commodity in the West would show a simple average ratio of revenue to variable cost of 191 percent, falling from 227 percent.

With regard to the high ratio of revenue to variable cost for one movement of aluminum residues mentioned earlier, the eastern railroads indicate a ratio of revenue to variable cost of 344 percent for the movement of aluminum residues from Ravensworth, W. Va., to Newark, Ohio. Commission results shows a much higher ratio of 582 percent for the same movement. The TEA indicates in their cost results a carload revenue of \$918 for this movement while page 429 of Eastern's appendix 1 (Verified Statement No. 11) indicates a carload revenue of \$1,649.36 which is the indicated weight, 77.8 tons, multiplied by the indicated rate of \$21.20 per ton. This is the carload revenue used by the Commission as there is no indication as to why they used the lower revenue total in its revenue-cost comparisons.

In summary, the following table best illustrates the comparison between revenue-to-variable cost ratios for virgin commodities and recyclable commodities.

TABLE 37

Average ratios of revenue to variable cost (percent)

	East		South		West	
	Respond- dents	Commis- sion	Respond- dents	Commis- sion	Respond- dents	Commis- sion
<i>Virgin</i>						
10 511 - Crude bauxite ore--	186	172	188	160	160	152
<i>Recyclable</i>						
33 342 - Aluminum residues-	285	431	223	227	232	213
<i>Virgin</i>						
10 511 - Crude bauxite ore--	186	172	188	160	160	152
10 513 - Calcinated or acti- vated bauxite ores	132	128	178	170	184	180
<i>Recyclable</i>						
40 214 - Aluminum or alloy scrap-----	187	177	190	184	187	161
<i>Virgin</i>						
10 513 - Calcinated or acti- vated bauxite ores ---	132	128	178	170	184	180
<i>Recyclable</i>						
33 398 - Miscellaneous non- ferrous metal residues-----	339	319	.....	.....	227	173
40 1 - Ashes-----	.....	343	124	118	226	183

PART I B

TRANSPORTATION CHARACTERISTICS

Respondents and supporting shippers.—Respondents argue that there are differences in the transportation characteristics of alumina or bauxite and aluminum scrap. The TEA illustrated the differences in the transportation characteristic of alumina and scrap by comparing the movement of alumina from Little Rock to Norfolk, Va., and then to Massena, N.Y., a distance of 1,005 miles, where a large aluminum reduction plant of an integrated producer is located.

The alumina, which is mined near Little Rock moves from Norfolk in covered hoppers furnished by shippers in trainloads averaging 4,815 net tons.

A certain amount of scrap aluminum is also consumed at Massena. It originated at 15 origins during 1974 and moved an average of 413 miles with an average weight of 34 tons per car. Aluminum scrap moves in carrier-furnished general service box cars and in gondolas. Nonferrous scrap is of high value, susceptible to pilferage, and moves in boxcars D.F.-equipped which are furnished at extra expense by the carrier.

In the West, aluminum residues and slag are generally transported in gondolas specially equipped with covers. Equipment is generally unassigned except for one movement which qualified for multi-car rates. Generally there is an empty return.

Penn Central (now a part of ConRail), reported originating import shipments of bauxite ore in 1975 from North Atlantic ports. The ore was shipped to processors who converted it into calcined alumina, however, the majority of the bauxite moved to abrasive industries in New York and Massachusetts, and to Canadian receivers. The ore generally moved in covered hopper cars at an average load of 72.4 tons per car over a distance of 273 miles.

Opposing shippers.—The Aluminum Association Incorporated, (AAI) maintains that it is improper to compare the rate structure of aluminum or bauxite with that of aluminum scrap because of different transportation characteristics. In addition, AAI analyzed the nature of the movement of aluminum residues, and aluminum scrap and residues using the Department of Transportation's (DOT) 1 percent waybill sample for the years 1973 and 1974.⁵⁰ From these statistics it was noted that approximately 40 percent of such traffic moves in the official territory and that the movement of scrap is primarily intraterritorial. It points out that in 1973 the average haul per car of scrap moving throughout the country was about 650 miles with an average weight of 36.5 tons. Within the official territory

1973 Carload waybill statistics U.S. to U.S.

Commodity	STCC No.	Average NT/ car	Average revenue/ car	Average haul/ car
Bauxite and other aluminum ores.....	10 5	87.0	\$514	513
Calcined or activated bauxite ore (alumina).....	10 513	89.0	503	526
Aluminum or aluminum alloy.....	40 241	36.5	685	649
Aluminum residues.....	33 342	55.4	642	394

356 I.C.C.

average loading was 38.3 tons per car with an average haul per ton of 466 miles. Average revenue per 100 pounds in 1973 was 78.4 cents and 86.5 cents in 1974. Over 50 percent of aluminum residues also moved within official territory. Carloadings of residues generally exceeded 50 tons per car and the average haul (U.S. to U.S.) increased from 394 miles in 1973 to 486 miles in 1974. Per car-mile earnings within official territory were \$2.12 in 1973 and \$1.83 in 1974. AAI also compared the costs and revenue of scrap and residues as shown in the waybill statistics for 1973 and 1974. These show that the average load of aluminum scrap per car has generally decreased from 1973 to 1974; and the revenue as a percentage of costs has decreased.

Other transportation characteristics of bauxite or alumina which differentiate it from scrap according to the AAI are: (1) multiple cars or in trainloads; (2) regular shipments and on a high annual tonnage basis; (3) shipper-owned equipment or covered hoppers which turnaround rapidly; (4) is unloaded by special machinery which does not damage the car; (5) originates from and is destined to relatively few points; and (7) low loss and damage claim ratios.

It is the position of AAI and Reynolds that although the rates on aluminum scrap and residues are above a maximum reasonable level and thus unjust and unreasonable, they are not unjustly discriminatory because scrap does not compete with alumina. For example, AAI states that the cost studies of the Southern Railways, based on 1975 costs and revenues, discloses that revenues on aluminum residues exceed variable costs by 122 percent and fully allocated costs by 73 percent. Aluminum scrap revenues exceed variable costs by over 90 percent and fully allocated costs by 54 percent. AAI argues that any rates which produce revenues exceeding fully allocated costs by over 50 percent and which nearly double variable costs are excessive. It requests that the rates be lowered to a level not exceeding fully allocated costs.

AAI further maintains that aluminum scrap and residue rates are producing excellent revenues for the carriers and are moving at exceptionally high rate levels. This conclusion is apparently based on the fact that the average revenue per 100 pounds was 78.4 cents for aluminum scrap in 1973 and 86.5 cents in 1974 while the average revenue per 100 pounds for all nonferrous scrap was only 59.7 cents in 1973.

Reynolds assails the reference to aluminum scrap by itself as simplistic. There are several types of aluminum scrap and there are various physical characteristics which should be taken into account

356 I.C.C.

in computing costs. If proper evaluation is to be made, aluminum scrap, should not be considered in the aggregate, but rather according to the type of scrap, such as "old scrap" (beverage containers), "new scrap" (clippings and trimmings from the manufacturer of such items as aluminum can lids) and "obsolete scrap" (material from obsolete parts such as airplane parts for airplanes no longer in use).

In addition, the manner in which aluminum scrap is offered for transportation and its density loadability are factors that should be taken into consideration for cost purposes. Such scrap can be tendered loose, baled or compacted into briquettes and shipped on skids. The way in which the scrap is tendered affects the loadability and is a cost factor which should be taken into consideration.

NARI groups the results of the respondent railroads and redisplay these results for each territory, weighting such results according to the carloads of each commodity taken from the 1974 DOT 1-percent waybill sample. NARI criticizes the railroads for merely presenting their results on a commodity basis, for not displaying weighted results for groups of virgin and recyclable commodities and comparing these results for recyclable commodities with their competing or potentially competitive virgin counterparts.

Without changing or adjusting the ratios of revenue-to-variable cost shown by the railroads, NARI weights those results by their mix in the 1-percent waybill sample. Those results are shown below:

Ratio of revenue to variable cost for aluminum		
Territory	Virgin	Recyclable
East	175.2	186.0
South	180.3	190.3
West	160.5	173.1

NARI's results show that in each territory the ratios of revenue to variable cost, when weighted appropriately by the 1-percent waybill sample, are higher for the recyclable commodities.

U.S. Reduction⁵¹ (Reduction) on behalf of NARI, compared single-car rates on aluminum with those on scrap and residues. It

⁵¹Reduction is a major recycler of aluminum scrap and residues, with processing plants at East Chicago, Ind.; Federal, Ill.; Marietta, Pa.; Mira Loma, Calif.; Russellville, Ala.; and Toledo, Ohio. The aluminum scrap and residues are shipped in plain boxcars without need for any type of DF equipment and loss and/or damage claims are infinitesimal. Although Reduction agrees with AAI that the rates are too high on scrap and virgin materials, it does not concur in AAI's conclusion that alumina bears a greater transportation burden than scrap and residues or that these commodities are noncompetitive.

contends that the carrier data shows that rates within the Southwest on aluminum reflect approximately 11 percent of class 100 and the north Pacific coast territory rates are 6 percent of class 100. These are compared with aluminum scrap rates which vary from 16.6 percent to 19.2 percent of class 100 and for aluminum residues which vary from 12.3 percent to 17.3 percent of class 100. Reduction contends that this and the ratio of revenue to variable costs on comparative virgin and recyclable materials support the conclusion that rates on aluminum residue and scrap are (a) unnecessarily high; and (b) discriminatory when compared to rate levels on crude and calcinated bauxite ores.

Rebuttal.—On rebuttal, TEA points out that the rates on nonferrous scrap were negotiated by the eastern railroads and the predecessor of NARI (NASMI)⁵² in 1960, and that the rates were described as being fair and equitable.

Discussion and conclusion relative to shipper comments.—AAI decries the comparison of the rate structures of bauxite and aluminum scrap because of different transportation characteristics. Different transportation characteristics must and should be taken into consideration whenever possible. However, the fact that different transportation characteristics exist does not preclude an examination of the rate structure or determination of costs of service. To this end, cost data developed by the Commission, reflects differing cost transportation characteristics by giving effect to car type and single-car, multiple car, and trainload movements, et cetera. Noncost transportation characteristics such as the value of service, value of the commodity, and intermodal competition, et cetera will also be considered in determining whether the rate structure is unjust, unreasonable, or discriminatory.

AAI cites the "excellent revenues" produced by aluminum scrap for the railroads. The basis for making that determination should be the revenue-cost comparison. AAI's measure of "excellent revenues" is inappropriate inasmuch as a rate which is large in terms of dollars is only beneficial if that rate exceeds the cost of providing that service. The rate of revenue per se does not give any indication of the profitability or contribution to burden of a certain movement or traffic.

Reynolds cites the different types of scrap and the different transportation characteristics of each. With regard to transportation costs, the various factors are, for the most part taken into

⁵²National Association of Secondary Materials Institute.

consideration. For example, the density of the scrap would be reflected in the weight of the shipment and hence affect the cost of that movement. However, there is no data of record to indicate the extent to which the characteristics differ from the average.

NARI attempts to redisplay the result of the respondent railroads, using the relative weights of each commodity from the 1974 DOT 1-percent waybill sample. While agreeing that weighing of the cost data for two or more commodities for comparative purposes has merit, the method used by NARI is suspect. The data of record is not the result of a statistical sample. There is no basis for assuming that the same consist of traffic movements exists in the data of record as in the 1-percent waybill sample. In the absence of more complete data weighting cannot be performed properly.

We will use the two ratios developed by the Commission from the movement presented by respondents in determining whether the rate structure is unjust, unreasonable or discriminatory since these ratios most accurately portray the rate structure of a commodity in a particular territory.

PART II

HISTORICAL EVIDENCE IN UTILIZATION OF RECYCLABLE MATERIALS

Respondents and supporting shippers.—TEA points out that 87,000 tons of aluminum were recovered from aluminum cans reflecting 25.4 percent of all cans used in 1975. This represented a 68.9-percent gain over the 51,500 tons recycled in 1974. A substantial portion of these cans move by rail. TEA contends that there is no indication that the level of freight rates has had any detrimental effect on the movement of traffic.

Respondents also submitted data on the amount of recyclable traffic handled over the years. Generally, the total amount of recyclable traffic has increased. However, evidence as to the amount of aluminum scrap or residues handled, or for that matter, other specific nonferrous metal or residues is not always presented. In the case of carrier organization data showing territorial originations, this information was alleged to be difficult or impossible to obtain because the freight commodity statistics do not break down the tonnages of each of the types of nonferrous scrap. The following table prepared by the TEA, however, shows the tonnage originated and gross freight revenue of nonferrous scrap by territory.

TABLE 38

Nonferrous scrap

(STCC NOS 40-212, 40-213, 40-214, and 40-219)

Year	Tons originated				Gross freight revenue			
	U.S.	East	South	West	U.S.	East	South	West
1966	1,976,682	821,831	217	939	\$23,137,623	\$10,309,592	\$2,317	\$10,511
1967	2,668,691	949,421	244	1,475	22,152,745	9,514,531	2,509	10,129
1968	2,649,933	876,896	241	1,532	25,198,230	11,139,810	2,649	11,409
1969	2,996,135	817,769	473	1,706	27,315,139	11,093,606	3,363	12,859
1970	2,697,795	829,990	361	1,508	30,259,001	12,168,608	4,084	14,506
1971	2,553,844	732,092	300	1,521	30,480,911	11,464,996	4,581	14,435
1972	2,750,534	767,925	321	1,663	31,752,749	11,686,606	5,333	14,733
1973	2,270,641	777,414	382	1,112	33,790,921	12,826,921	5,978	14,986
1974	2,430,181	756,639	403	1,270	43,216,045	14,510,045	7,622	21,085

Excluding DT&I R.R. Co.

The following table shows the amount of traffic handled or originated by various carriers and carrier organizations for the period 1970 through 1975.

TABLE 39

Crude and calcinated bauxite ores, and aluminum residues (STCC Nos. 105 11, 105 13, and 33 342)

TONNAGE CARRIED (1970-1975)

Territory	STCC	Carrier	1970	1971	1972	1973	1974	1975
West	10 511	CRIP	N/A	N/A	37,769	323,272	365,101	125,023
		MP	165,131	8,947	103,629	71,691	65,776	58,778
West	10 513	CRIP	N/A	N/A	472,985	628,605	695,918	274,694
		MP	1,172,806	1,002,753	1,093,559	1,234,935	1,300,648	1,120,815
Southern district	10 511	KCS	1,384,503	1,231,755	1,049,670	1,492,531	1,557,166	1,404,132
		UP	2,686,783	2,889,478	3,132,129	3,807,854	4,104,842	971,374
Western district	10 513	KCS	N/A	688,982	717,407	868,676	877,149	707,342
		UP	363,806	316,466	236,601	412,855	512,360	420,280
West	33 342	CMSP	4,064	2,613	2,610	9,198	9,620	2,154

The prices of nonferrous scrap have fluctuated and varied substantially with no relationship to general rate increases, according to respondents who contend, that rates thusly have no effect on the movement of traffic.

The Southern made a comparison of the prices of bauxite ore and aluminum scrap and the average rate on those commodities. It computed the ratio of rate to price. As shown in tables 41 and 42 the rate on aluminum scrap is a significantly lower percentage of price than that to bauxite ore.

TABLE 40

Bauxite ore (STCC No. 10 5)

(IN DOLLARS PER NET TON)

Year	Price ¹	Average rate	Ratio rate to price
			Percent
1974			
1973	\$9.83	\$4.90	49.8
1972	10.34	4.65	45.0
1971	9.46	3.10	32.8
1970	10.55	3.16	30.0
1969	10.61	2.84	26.8
1968	10.27	2.38	23.2
1967	10.23	2.19	21.4
1966	8.66	2.04	23.6
1965	8.66	2.17	25.1
	8.50	2.18	25.6

¹Average value of crude, undried, domestic bauxite shipments, f.o.b. mine or plant—Bureau of Mines—Mineral Yearbooks.

356 I.C.C.

TABLE 41
Aluminum scrap (STCC No. 40 214)
(IN DOLLARS PER NET TON)

Year	Prices		Average rate ¹	Ratio rate to price	
	Cast aluminum ¹	Aluminum clippings ¹		Cast aluminum ¹	Aluminum clippings ¹
					Percent
1974	\$255.60	\$323.60	\$8.70	3.4	2.7
1973	171.60	223.20	8.20	4.8	3.7
1972	110.40	150.40	6.87	6.2	4.6
1971	140.00	166.80	6.65	4.8	4.0
1970	195.80	218.80	5.90	3.0	2.8
1969	229.60	260.80	4.40	1.9	1.7
1968	168.20	201.60	5.36	3.2	2.7
1967	168.00	209.80	5.23	3.1	2.5
1966	206.00	255.20	5.35	2.6	2.1
1965	243.00	293.60	5.30	2.2	1.8

¹Based on monthly averages of dealers' buying prices in New York, compiled from quotations published daily in *American Metal Market*, in cents per pound converted to net tons.

Based on Metal Scrap STCC No. 40 21 (Metal Scrap) Minus STCC No. 40 211 (Iron and Steel Scrap). Based on total tons carried.

356 I.C.C.

TABLE 42

The IEA prepared the following chart showing the tonnage of ashes originated in the various territories, and the gross revenue thereof
ASHES (STCC NO 40 11)

Year	Tons originated				Gross freight revenue			
	U.S.	East	South	West	U.S.	East	South	West
1966	354,706	238,154	51	65	\$1,094,135	\$636,393	\$206	\$252
1967	364,005	255,072	61	48	1,206,693	784,455	242	181
1968	325,493	231,150	33	62	1,221,029	817,505	191	213
1969	262,470	204,424	23	35	1,042,062	697,627	120	224
1970	247,761	197,820	13	37	954,286	694,328	84	176
1971	220,205	95,551	11	113	1,314,369	479,364	71	764
1972	210,193	188,738	8	13	832,922	656,858	59	117
1973	183,282	158,727	5	19	758,000	509,000	39	210
1974	149,973	131,030	4	15	724,000	478,000	38	208

356 I.C.C.

Opposing shippers.—In an earlier proceeding NARI had commissioned a study by Denenholz & Janer, railroad traffic and distribution consultants, to demonstrate what effect general rate increases have had on recyclable materials. It offered the study into evidence for the sole purpose of showing the increase in rates caused by general increases. The following table, NARI contends, shows how the increases since 1959 have aggravated and distorted the rate structure between shipments of virgin bauxite or alumina and recyclable scrap.

356 I.C.C.

TABLE 43

Rate disparity and impact of rate increases

Ex Parte Nos	Aluminum dross (STCC 33 34215) and Aluminum scrap (STCC 4021)			Bauxite ore (STCC 10511) or Alumina or calcined (STCC 105)		
	Ex parte increases per hun- dredweight	Rate in cents per hundredweight		Ex parte increases per hun- dredweight	Rate in cents per hundredweight	
		(¹)	(²)		(¹)	(²)
223.....		1	82	144	61 1/2	1/2
					50	NA
256.....		3	85	147	62	2
						31 1/2
259-B.....		5	89	154	64	5
262.....		6	94	163	67	6
265-B.....		6	100	173	71	6
267-B.....		11	111	192	75	12
281-B.....		3	114	208	77	4
295-B.....		3	117	124	79	3
299-B.....		2.8	120	220	81	2.8
303-B.....		4	125	229	84	4
305-A.....		3.3	129	237	87	3.3
						84
						131
						42 1/2
						41
						126 1/2
						78
						118 1/2
						38 1/2
						37 1/2
						36
						109 1/2
						98
						62
						58
						54
						87
						32
						32
						32
						86
						52
						NA
						NA
						31 1/2

356 I.C.C.

See footnotes at end of table.

TABLE 43

Rate disparity and impact of rate increases—Continued

Ex Parte Nos.	Aluminum dross (STCC 33 34215) and Aluminum scrap (STCC 4021)		Bauxite ore (STCC 10511) or Alumina or calcined (STCC 105)	
	Ex parte increases per hun- dredweight	Rate in cents per hundredweight	Ex parte increases per hun- dredweight	Rate in cents per hundredweight
		(¹)	(¹)	(¹)
	Percent		Percent	
305-RE	10	142	10	92
310-A	5	149	7	98
313	5	153	5	103
313	2.5	153	2.5	106
				144
				154
				162
				166
				47
				50
				53
				54

¹Eastern Territory²Western Territory³Southern Territory⁴No increase⁵Not available

356 I.C.C.

AAI also states that the movements shown above, are not typical, are not between the same points, and are not shown to have similar transportation characteristics.

The Aluminum Association also looked at the nature of the rate increases as compared to the wholesale price index which shows that scrap rates have increased less than alumina rates.

TABLE 44

The Aluminum Association's comparison of relevant indices

Year	Wholesale price index ¹		Estimated rate index ²		
	All commodities	Industrial commodities	Alumina	Ingot	Scrap
1966	100.0	100.0	100.0	100.0	100.0
1969	106.7	107.6	114.6	114.3	114.7
1971	114.1	115.7	135.5	133.8	133.8
1972	119.3	119.7	142.1	140.1	133.8
1973	135.0	127.8	146.4	144.2	137.8
1974	160.4	156.1	177.9	169.4	156.7
1975	175.3	174.1	204.9	192.5	184.5
March 1976	180.0	181.6	210.6	193.3	194.5

¹Handbook of Labor Statistics, 1975, U.S. Department of Labor, Bureau of Labor Statistics, p. 344, Wholesale Prices and Price Indexes, Data for February, 1976, U.S. Department of Labor, Bureau of Labor Statistics, p. 7, and Wholesale Price Index News Release Revised for January, U.S. Department of Labor, Bureau of Labor Statistics, April 19, 1976.

²This has been computed based on specific applications and territorial movement as shown by Waybill Statistics.

The rate disparity between the involved recyclable virgin commodities is alleged to be unjust, unreasonable, and discriminatory, and NARI contends, that even if the rates were justifiable in 1959, there is no justification for the disparity in rates that has developed since that time. It is also shown: (1) that at the Ex Parte No. 305 level the rates on scrap aluminum are 56 percent of the rates on counterpart virgin materials; (2) that virgin materials are 9.4 percent of class 100 whereas scrap aluminum rates are 16.3 percent of class 100; and (3) that the spread between rates on scrap and counterpart virgin materials has increased 74.8 cents per 100 pounds or 80 percent from 1959 to the Ex Parte No. 305 increase.

NARI also looks at the revenue per car for aluminum residue (\$1,299), aluminum scrap (\$805), and miscellaneous nonferrous residue (\$1,789), in comparison to that of calcinated bauxite ores 356 I.C.C.

(\$644) in the West and concludes that this shows that the rates are prima facie unreasonable.

Utilizing the figures given in the 1973 *Carload Waybill Statistics*, AAI determined the transportation costs for producing 1 net ton of aluminum from virgin materials versus 1 net ton from scrap. From their figures it is argued that the estimated freight costs incurred in the various movements in producing 1 net ton of aluminum from virgin materials are \$42.88 while the cost for transporting the material to produce ingot from scrap is \$23.79. AAI also includes the costs to transport primary aluminum (estimated at \$21.64 per net ton). This cost is not included in the total transportation cost of ingot from scrap, which generally moves to other facilities for further processing and would, therefore, appear to have the same cost.

From these figures AAI argues that aluminum ingot has more than twice the transportation burden of scrap. Although it contends that there is no comparison or competition between scrap and the "so-called" virgin counterparts, it concludes that the problem with scrap rates does not arise out of their relationship with rates on bauxite, alumina, or ingot, but in the scrap rates themselves.

Reduction, on the other hand, argues that this analysis overlooks the substantial transportation burden that accrues against a ton of secondary ingot. It contends that as much as 50 percent of the original shipped weight may be lost in the drying process to prepare borings for remelting and that on the average, only 80 percent of the scrap aluminum charged is recoverable as aluminum ingot.

In addition it is contended by Reduction, that 1 ton of scrap does not necessarily produce 1 ton of ingot. For example, aluminum smelting residues average 20-percent aluminum content. Therefore, to obtain 1 ton of recycled aluminum, 5 tons of residues are needed. Four tons of drosses, which have a 25 percent metallic content are needed to produce 1 ton of ingot. There are also the additional costs for the transportation of fluxing material and the movement of aluminum scrap to collecting sites or scrap yards. It is, therefore, concluded, that secondary aluminum carries a transportation burden equal to or greater than that of primary ingot.

Rebuttal.—The TEA takes exception to the conclusion of NARI that the utilization of nonferrous scrap has remained stagnant or has declined. This contention, it is argued, is not substantiated by the U.S. Bureau of Mines Statistics which are as follows:

356 I.C.C.

TABLE 45

RECYCLING TRENDS SINCE 1960							
Production From Scrap As Percentage of Nation's Metals Consumption							
	ALUM.	LEAD	TIN	ZINC	REFINED COPPER	BRASS & COPPER	FERROUS
1975	24%	51%	22%	23%	—	—	31%
1974	20	44	20	20	23	44	35
1973	20	42	22	20	19	41	31
1972	19	42	23	21	19	41	32
1971	18	42	28	22	20	42	30
1970	21	44	28	22	25	45	27
1969	21	43	29	21	23	45	28
1968	20	41	28	20	22	45	27
1967	20	44	28	20	21	43	27
1966	21	43	30	20	21	41	29
1965	21	48	30	20	22	44	29
1964	20	45	29	19	19	42	27
1963	23	42	29	16	17	40	29
1962	20	40	31	20	18	41	28
1961	19	44	36	20	18	41	28
1960	20	48	36	23	22	45	28

Source: Adapted from Bureau of Mines data in government's annual *Minerals Yearbooks*.

Source: American Metal Market, August 13, 1976.

These figures show an increase in recycling even though freight rates have increased during the period shown. NARI contends, however, that the figures shown in the above table for the year 1975 are adapted from the Bureau of Mines Statistics, and do not reflect the actual amounts recycled. Therefore, it is incorrect to assume that there has been an increase in recycling in 1975.

PART III

SENSITIVITY OF RECYCLABLE MATERIALS TO CHANGES IN TRANSPORTATION RATES

Respondents and supporting shippers.—It is the position of WRA that scrap aluminum and alumina do not compete because the processes involved in the production of each commodity, and the end products are different. Impurities in scrap make it difficult for it to be used in products other than castings. In addition, it contends that if a comparison is made between scrap aluminum and a virgin material, it should be made between alumina and scrap since bauxite must be refined into alumina before it can be processed into ingot.

The movement of alumina and scrap aluminum between the same two points is also alleged to be very small. Utilizing the WRA

356 I.C.C.

Revenue Need Statistics, it was determined that out of 80,865,312 (hundred weights) of alumina, scrap was potentially in direct competition with 2,533,357, or 3 percent. This is out of 6,585,279 (hundred weight) of scrap moved, or 30 percent.

The Gellman Study states that new aluminum scrap is virtually 100 percent recycled at the present time. Therefore, it focuses its analysis on obsolete scrap, considering both the supply and demand of the virgin material and old scrap to determine what effect freight rates have on these commodities.

It contends that secondary smelters are the only volume consumers of obsolete aluminum scrap because primary producers and nonintegrated fabricators and foundries are unable to use scrap because their products require a higher degree of purity. Therefore, old scrap is excluded from approximately 80 percent of the aluminum market, which the primary producers have and there is no competition or interdependence between primary and secondary aluminum in the production process.

It is also argued, that the aluminum produced by secondary smelters does not generally compete with primary aluminum. This is because secondary smelters compete in the casting industry and have, 73 percent of the market, and in the deox market 60 percent, which are only a very small portion of the total aluminum market. Therefore, Gellman contends that altering the delivered prices of primary and old scrap aluminum will have no appreciable effect on the amount of either commodity consumed.

Gellman concludes that both the supply and demand curve for scrap are inelastic. Supply is inelastic because (1) some types of aluminum scrap are widely dispersed; (2) some products are exported and, therefore, are never recycled in the United States; (3) some products go into storage and are not scrapped; (4) the aluminum industry, being a relatively young industry, has a relatively small resource base for scrap; and (5) technological restraints limit the amount of scrap that can be recycled. For these reasons, altering rail rates for obsolete scrap aluminum assertedly will not materially affect the amount of this commodity supplied.

It is also concluded by Gellman, that demand for obsolete aluminum scrap is inelastic. Demand for obsolete scrap is limited to the requirements of secondary smelters which process the ingot into die casting alloys. The major markets for die cast products are automobiles (over 50 percent), home appliances and industrial and commercial machinery and tools. Thus the demand is dependent, and because the casting industries and secondary smelters are not concentrated, the price of secondary scrap aluminum tends to

fluctuate with market conditions. The demand for obsolete aluminum scrap, therefore, tends to shift along a relatively stable short-run supply curve causing price fluctuations. This conclusion is confirmed by the econometric study done by Gordon.

According to Gellman, the Gordon study shows that the long-run supply of obsolete aluminum scrap with a price elasticity of supply of 0.624 is inelastic with respect to changes in price. Instead, it is more likely to increase with changes in technology. In the demand equation, neither price variable is significant (demand inelasticity of .0254). This indicates that the price of obsolete scrap is not an important determinant for the demand of this material.

Therefore, the supply of obsolete aluminum scrap is relatively stable in the short run, and is inelastic. In the long run, the supply of obsolete aluminum scrap will shift to the right (increase) due to changes in technology and increased utilization of aluminum in a variety of products. The demand curve is inelastic in both the short and long run. In the short run, shifts will occur due to changes in automobile manufacture, which will cause shifts along a stable and inelastic supply curves and variation in price.

After determining that the supply and demand curves of aluminum obsolete scrap are inelastic, the study further concludes that based on this finding, the elasticity of rail transport demand for the commodities is also inelastic. It is found that a 1-percent decrease in the rail rate would bring about a 0.0014-percent increase in the movement by rail. Therefore, rail rates play an extremely insignificant role in determining the amount of obsolete scrap aluminum which moves by rail.

Opposing shippers.—AAI concedes that scrap is used by primary and secondary smelters. It contends, however, that alumina and scrap aluminum cannot be substituted for each other in the production of aluminum ingot. After primary aluminum is produced, scrap of sufficient purity, either purchased or internal, can be added to the hood or furnace to make a particular type of alloy. This is alleged to be a complementary rather than a competitive relationship. Primary ingot can also be added to scrap to achieve a desired alloy.

It is also contended that the end products do not generally compete with each other. Although scrap can be made to the same identical chemical mix as alloys made from alumina, they are not generally in competition. Primary ingot is used principally for sheets, plates, wires, rods, and bars. Secondary aluminum is generally consumed by the die casting and foundry industry.

AAI argues, however, that although the transportation rates on aluminum scrap are not as high as those of ores, the costs are significant. As volume increases, it is submitted freight rates will become an increasingly important factor in the production costs of aluminum ingot made from scrap. Not only would the increased cost affect the movement of aluminum scrap but AAI contends that it could also discourage the recovery of other waste products since aluminum recovery is a large portion of the financial return of waste recovery systems. However, AAI concedes that if the price of aluminum scrap is \$300 a ton, that the lading value per car (38 tons per car) of \$11,400 shows that the freight revenue of \$770 per car is only 7.7 percent of the value of the lading.

NARI contends that primary aluminum producers are increasingly using larger percentages of recycled alumina in their operations. From this it is argued that recycled aluminum competes with bauxite and alumina in this market place. Competition also occurs at another level, for extruders and billet makers, consumers of primary aluminum, are also increasing their consumption of scrap. It concedes that the study made by the Battelle Institute found that an alloy made from scrap to the same specifications as alloy made from primary aluminum are indistinguishable and that the market for such products are the same. Railroad allegations that there is no competition, are merely based on hearsay.

Reduction also contends that secondary aluminum competes directly with primary aluminum in the die casting market, in the sale of deox aluminum shot and shapes, and in the aluminum sheet market. Primary producers and secondary smelters do compete in the casting market because two identical casting alloys produced to specification, by either a primary producer or secondary smelter, are completely substitutable. However, casting alloy ingots supplied by secondary smelters are preferred because prices are normally lower. There is greater competition between secondary smelters and primary producers for the die casting market in other areas such as the selling of hot metal. In 1968, however, there were only two smelters capable of transporting molten metal.

H. Davis & Son, Inc. (Davis), on behalf of NARI, contends the aluminum scrap is in direct competition with virgin ores. It states that unless a consumer can purchase scrap for less than virgin ore, there is no incentive for its use. The market price of scrap is directly related to the price of prime aluminum, Davis argues, and it fluctuates as the price of aluminum rises or falls. Davis also contends that freight rates do have an effect on the movement of aluminum scrap. It states that its marketing area for nonferrous

scrap is generally confined to a 250- to 300-mile radius since freight rates prohibit the sale of most of these commodities to consumers outside of this area. Davis sells its aluminum scrap to secondary smelters, primary producers, rolling mills, ingot makers, and foundries. However, it indicates that over the last 5 years, it has discontinued handling a great number of items such as drosses, residues, and skimmings which have a value of \$1 per ton because it is uneconomical to do so. For example, residues have a 25-percent metallic content so the freight factor must be multiplied by four to obtain the proper cost. This also applies to aluminum borings. It is also alleged that aluminum cans and lawn furniture because of their density cannot be shipped because the freight cost would exceed the value of the material. If the freight rates were reduced, it is contended that its plant would have 30 to 35 percent more aluminum scrap available for recycling.

The amount of aluminum scrap recycled by Reduction has increased from 472 million pounds in 1970, to 588 million pounds in 1974 (a 24 1/2-percent increase). However, the utilization of rail service to transport its raw materials is alleged to have declined as a percentage of total movement while in absolute terms the movement rose from 3,612 cars in 1970 to 3,688 cars in 1974. In 1975, as business activity slowed and only 480 million pounds were recycled, only 2,319 cars were received. It is contended that private carriage has captured a substantial share of the tonnage. This decreasing use of rail transportation is attributed to the use of less costly forms of transportation. If the freight rates on aluminum scrap are reduced, NARI predicts that the recycling of aluminum will increase 100 percent by 1986. There are no technological barriers to increased recycling and scrap resources are available. Presently we buy 1 million tons of aluminum each year. New programs and facilities are being developed by the government, however, to increase the amount of materials recycled. Unless new markets are created it is argued that these programs will fail for the development of new markets depends, according to NARI, on the elimination of unjust and discriminatory freight rates. NARI also notes that increased recycling will lower our dependence on foreign sources of supply.

PART IV

EFFECTS ON INDIVIDUAL RAILROADS

The roads reporting for the WRA indicate that revenues from crude bauxite and aluminum are important, however, the percent of 356 I.C.C.

such revenue to total revenue is less than 1 percent. The following table 46 shows the amount of tonnages or revenue for aluminum residue scrap, nonferrous scrap residues, and bauxite, compared to the total tonnage or revenue of the carriers.

Opposing shippers.—Reduction argues that if the rates are reduced to levels that are reasonable and compensatory, it would not jeopardize the carriers' profitability. NARI contends that the gross revenue derived from nonferrous scrap is minimal. If rates were reduced 40 percent nationally the railroads would lose approximately \$17 million, which would be allocated \$5.8 million to the eastern roads, \$3.1 to the southern roads, and \$8.1 to the western roads.

356 I.C.C.

TABLE 46

Aluminum scrap, residues, miscellaneous nonferrous metals, and ashes (STCC Nos. 33 342, 33 398, and 40 214)

PERCENTAGE OF TONNAGE OR REVENUE OF INVOLVED COMMODITIES TO TOTAL CARRIER TONNAGE OR REVENUE (1975)

Territory	STCC	Carrier	Carloads	Tonnage carried	Revenue from commodity	Percent to total tonnage	Percent to total revenue
East	33 342	ConRail	23				
	33 398	ConRail	23				
		PLE				0.03317	0.071
	40 214	Chessie		2,729	882,000	0.030	0.091
		ConRail	1,861	38,000	1,773,000	0.054	0.027
		NW		71,000	263,000	0.026	
		PLE		27,000		0.00883	
South	33 342	Frisco		727			
		LN	679	2,028			
		SCL	69	40,335			
		SOU		47,360			
	33 398	ICG	1				
		LN	10	753			
		SOU		2,105			
	40 214	ICG	109				
		LN	1,718	61,045			
		SCL	892				
		SOU		45,203			
West	33 342	CMSP	43	2,154	40,462		
	40 214	CMSP	794	25,443	496,021		
		Chessie		53,797			0.004
East	40 1	ConRail	13	322	15,400	0.0003	0.0008
		NW		50		0.0003	0.0001

356 I.C.C.

Aluminum scrap, residues, miscellaneous nonferrous metals, and ashes (STCC Nos. 33 342, 33 398, and 40 214)—Continued

PERCENTAGE OF TONNAGE OR REVENUE OF INVOLVED COMMODITIES TO TOTAL CARRIER TONNAGE OR REVENUE (1975)—Continued

Territory	STCC	Carrier	Carloads	Tonnage carried	Revenue from commodity	Percent to total tonnage	Percent to total revenue
South	40 1	LN	38	2,325	9,114		
		SOU		794			
		SCL	43				
West	40 1	Western district	510	35,031	425,547		

PART VI

ALTERNATIVE RATE STRUCTURES

Opposing shippers.—The AAI states that there have been specific commodity rates established on scrap where large movements are available and heavy loading is possible. It contends that it is in this area that the railroads should actively develop and establish rate levels that will encourage the movement of scrap in larger quantities and heavier volumes. Scrap rates should also receive special consideration from the carriers in connection with general-increase proceedings and special holddowns or exemptions should be granted where appropriate. However, AAI argues that since the Commission has not asked the carriers to address the issue of market dominance, it has no authority to find that the rates exceed a maximum level of reasonableness. Instead, it urges that environmental considerations and policies require that the maximum reasonable rate for aluminum scrap and residues should be no higher than the fully allocated costs associated with those movements.⁵³ Reynolds suggests that the Commission should establish some designated percentage amount above costs to be fixed as a maximum above which the respondents' revenue will not be permitted to exceed, without full justification to the Commission.

Davis suggests that an added incentive should be given to shippers who load the car heavier than the generally minimum weights of 80,000 pounds.

NARI argues that the market dominance proceeding⁵⁴ found that a revenue to variable cost relationship of 160 presumptively reflects a premium rate which supports a prima facie case of market dominance. Since recycling is in the public interest, then the ratios for nonferrous metals in excess of this amount are premium rates. It then argues that the national average ratio of 131.8 for all commodities as established in the 1972 Burden Study is the just and reasonable level. This ratio could be reached by (1) percentage rate reductions for each territory to that level,⁵⁵ or (2) by cancelling the

⁵³It is contended by AAI that if the ratio exceeds variable costs by 60 percent, it will frustrate the environmental and energy policies.

⁵⁴Ex Parte No. 320, *Special Procedures for Making Findings of Market Dominance*.

⁵⁵The percentage reduction for nonferrous metals proposed by NARI would be as follows: (footnote continued on next page)

356 I.C.C.

general increases on those commodities. After this is done, future rate increases must not be imposed which would cause the ratio to exceed 131.8 and general increases applied to recyclables shall be the same as those applied to competing virgin materials.

PART VII

OTHER EVIDENCE

Environmental considerations.—Considerable resource and energy savings can be made by recycling aluminum scrap. There is a conservation of bauxite and alumina and a decrease in the amount of energy consumed since it takes approximately 96 percent less electricity to recycle scrap into 1 ton of ingot than it does to make aluminum from virgin materials. The production of aluminum from cans rather than bauxite also produces 23 times less air emissions and 21 times less water pollutant per ton of aluminum produced. The following chart shows the environmental profile of aluminum production.

TABLE 47

Environmental profile of aluminum production from virgin and recycled materials

(PER METRIC TON OF ALUMINUM)

	System I virgin materials to wrought or cast ingots	System II aluminum casts to wrought ingots
Material inputs (kg):		
Bauxite	5,134	
Limestone	115.8	

(footnote 55 continued)

Recyclable commodity	Percentage reductions		
	East	West	South
Aluminum scrap	29	24	31
Aluminum residues	54	41	41
Lead and zinc scrap	31	37	45
Lead matte	32	34	32
Miscellaneous nonferrous metals	61	38	38
Zinc dross	33	27	48
Copper matte	35	49	35
Copper scrap	29	41	37

356 I.C.C.

Environmental profile of aluminum production from virgin and recycled materials—Continued

(PER METRIC TON OF ALUMINUM)—Continued

	System I virgin materials to wrought or cast ingots	System II aluminum casts to wrought ingots
Material inputs (kg)—Continued:		
Sodium chloride	139.7	
Aluminum fluoride	40	
Cryolite	10	
Fluorspar	50	
Scrap		1,155
Water discharged (liters):		
Process	160,266	4,141
Mining	1,091	10
Total	161,357	4,151
Air emissions (grams):		
Particulates	36,654	1,173
Sulfur oxides	88,603	715
Carbon monoxides	34,648	2,405
Hydrocarbons	86,804	5,029
Aldehydes	138,624	6,618
Organics	611	20
Fluorides	265	46
Chlorides	1,050	
Total	387,263	16,827
Water pollutants (grams):		
Total suspended solids	20,162	750
BOD	150	
COD	1,093	(1)
Oil and grease	327	
Iron	14	
Phenols	77	
Sulfide	10	
Ammonia	15	
Cyanide	3	0.02
Cadmium		0.004
Lead		0.008
Manganese		0.009
Fluoride	1,000	
Chloride		340
Total	22,851	1,077
Solid wastes (kg):		
Overburden	28,800	329
Processing	15,478	592
Post-consumer		1,440
Total	44,278	1,521

See footnotes at end of table.
356 I.C.C.

Environmental profile of aluminum production from virgin and recycled materials—Continued

(PER METRIC TON OF ALUMINUM)—Continued

	System I virgin materials to wrought or cast ingots	System II aluminum casts to wrought ingots
Energy (kcal.)		
Total	74,830,600	2,472

Controlled by Effluent Guidelines and Standards, 40 CFR 421.20.

Controlled by Effluent Guidelines and Standards, 40 CFR 421.30.

Source: Calspan Corp. "Environmental Impacts of Virgin Recycled Steel and Aluminum."
(Draft prepared for the EPA-February 1974.)

In addition, there is a decrease in the amount of waste polluting our environment. In 1973, discards of aluminum into the municipal solid waste stream totaled 1.0 million tons, or 0.7 percent of the waste. Half of the aluminum discards were cans, 1/3 foils, and the remainder appliances. Of this amount, approximately 34,000 tons of aluminum or 3.5 percent was recovered, the largest portion coming from aluminum cans.³⁶

The Environmental Impact Statement indicates, however, that despite these environmental considerations, the level of the freight rates is merely one factor in the overall price of aluminum scrap, and its recycling. Because of the inelasticity of demand and supply of aluminum scrap (its demand and supply curve being derived from the demand and supply curve of primary aluminum), a change in rates will have little effect on the demand for scrap. The following table shows the impact that a change in the rail rates will have on the demand and consumption of aluminum scrap as projected in the FEIS.

³⁶The Aluminum Association reports that in 1974, approximately 17 percent of the all-aluminum cans were recovered.

TABLE 48

Effect of change of rates on demand

Rail rate change	Percentage effect on demand	Change in annual con- sumption of scrap
-20.....	+ .02	+ 60
-10.....	+ .01	+ 30
0.....	0	0
+ 10.....	-.01	- 30
+ 20.....	-.02	- 60

DISCUSSION AND CONCLUSIONS

Secondary smelters and foundries do not consume alumina or bauxite ore in addition to or in lieu of aluminum residues or scrap. Instead, their facilities are limited to the consumption of scrap or primary aluminum ingot. The use of primary aluminum ingot is a complementary relationship since it is generally used to upgrade or dilute an alloy to a desired purity. Therefore, to determine whether there is a potentially competitive relationship, we must determine whether a primary producer, who does consume alumina as an input, can also use scrap as a substitute.

Any consumption of aluminum scrap by a primary producer in the production of aluminum from alumina is generally limited to home scrap. This scrap, which is generated within the plant, is of a known purity (unlike obsolete scrap) and can be introduced into the production process. Because this scrap is completely recycled within a plant and is not transported, it does not compete with alumina as an input but instead is complementary to its use.

Although primary producers principally consume home scrap, on occasion they enter the scrap market to purchase select types of scrap to augment their captive supply when there is a shortage of primary metals. Prompt industrial scrap (approximately 30 percent of aluminum scrap is of this quality), such as sheet or clippings can be remelted for reuse in alloys of similar composition by primary producers. This entry into the scrap market does not mean, however, that alumina is competitive with scrap. Instead it indicates a complementary relationship which requires the consumption of scrap as an additional raw material, not one that replaces alumina. This conclusion is also supported by the fact that there is no

indication of cross elasticity of demand between alumina and aluminum scrap, that is, that a shift in the consumption of one is correlated to an opposite shift in the other commodity's consumption.

As stated by the Bureau of Mines⁵⁷:

Just like the tick bird, the secondary industry relies heavily upon the primary industry for survival. The primary industry, like the huge rhinoceros, could shoo away the secondary industry and force it to struggle for a separate existence. This is always possible because primary producers could easily control much of the supply of new aluminum scrap. The primary industry does not want to do this, however, for it depends heavily upon the secondary industry for casting alloys, hardeners, and other products from secondary smelters. Many secondary smelters also act as dealers for LCL (less than carload) distribution of primary aluminum. The mutual benefits primary and secondary aluminum industries share, combined with a common goal for improving quality standards, makes them completely compatible.

NARI contends, however, that the end products of a primary producer and secondary producer compete. This does not seem to be the case. Although scrap can be refined to a purity equal to that of pure primary ingot, this is not generally done because it is difficult and uneconomical to remove the metallic impurities or alloys from the scrap by usual melting and refining techniques. This limits the use of secondary ingot to the casting industry which consumes 90 percent of the secondary smelters' output. Although an alloy made by primary producers which has the same specifications as a secondary aluminum alloy ingot can be substituted for the secondary ingot, the secondary ingot is generally purchased because it enjoys a price advantage over the latter. There is some indication that there may be a more competitive relationship in the hot metals market, however, the degree of this competition and its relative share of the total aluminum market is not known, and we are, therefore, unable to determine what the full competitive relationship is, if any.

Therefore, we conclude that aluminum scrap does not compete with alumina.

We also find that even if there was a competitive relationship, it would not require that ratios for scrap and alumina be equalized. We do not know the exact price for alumina, but we do know crude bauxite ore sells for between \$8 and \$10 a ton, and alumina has an aluminum content of 25 percent. The value of aluminum scrap is considerably higher and the ratio of rate to price is relatively low (generally between 2 and 4 percent). Aluminum scrap also has

⁵⁷"Impact of Technology on the Commercial Secondary Aluminum Industry," *supra*, p. 58.

stored within it certain energy savings which make it more valuable than alumina. It, therefore, can bear a higher ratio and still move. In addition, the evidence of record indicates that the disparity in ratios has not unduly prejudiced the movement or consumption of aluminum scrap causing a corresponding increase in the movement or consumption of alumina.

Although NARI has presented data showing how the disparity in rates between scrap and alumina has increased, this alone is not sufficient to support a finding that rates have disadvantaged one commodity to the benefit of another. Nor have they successfully rebutted respondents' evidence that shows that there is no such relationship.

As to miscellaneous nonferrous residues, we conclude that there is no competitive relationship with alumina. It appears that competition is unlikely since the purity of this commodity would be more questionable than it is for aluminum scrap. If it is consumed by primary producers, it is likely that it is used to achieve a desired alloy, a complementary relationship rather than a competitive one.

Lastly, the evidence does not establish that ashes compete with alumina. We are aware that ashes are used in the manufacture of cement, as is a small portion of alumina supply. However, we do not know whether the use of these two materials is competitive or complementary. The evidence also fails to establish that the decreasing movement of ashes is caused by the increasing movement of alumina, to the consumers of both these products, since no data has been supplied on the use of either commodity by cement manufacturers.

Next we will determine if the rate structures on aluminum residues and scrap, and miscellaneous nonferrous metals are just and reasonable.

In the East, the ratio for aluminum residues is 431. This is almost double the ratio in the South (227) and West (213). Aluminum residues do not have as high a metallic content (20 percent) as aluminum scrap (80 percent) and it therefore does not appear that based on its ability to bear a greater transportation rate than scrap, it should have such a high ratio.

No information was presented as to the exact value of this residue,⁵⁸ the ratio of rate to price, or the amount of tonnage originated or handled in the East over a period of years. There is

⁵⁸It is contended by Reduction that aluminum residues have a value of \$1 a ton with a 10- to 30-percent metallic content. Although the value appears low in consideration of its metallic content, it is evident that it is less able to bear a high transportation burden as that of aluminum scrap.

also no justification given for the disproportionately high ratio. We realize that the eastern carriers are in financial difficulties and that a rate reduction may cause some hardship. However, a decrease in the rates may increase the revenue of the railroad if it is able to attract more traffic and, therefore, more revenue. In addition, since there does not appear to be a significant amount of tonnage moving, a rate reduction will not jeopardize their financial status. We, therefore, order the rates reduced by 15 percent.⁵⁹

We are also not persuaded by respondents' arguments that freight rates have no effect on the movement of the commodity. The Gellman analysis did not specifically disaggregate this commodity from its analysis of aluminum scrap and it used aluminum scrap in its economic equation. Respondents also failed to provide the tonnage of this commodity moving over a period of years which would show if the tonnage handled has increased or decreased and, therefore, an indication of the effect of general increases on the movement of traffic. Since respondents have the burden of proof, we conclude that this rate structure is not shown to be just and reasonable.

In the South, movements for only aluminum residues and aluminum scrap were presented. The ratio for the residues is 227 which is higher than that for scrap (184). As stated in our discussion of the East's ratio, residues have a lower metallic content than scrap and it does not appear that this higher ratio is justified. Also as stated above, no specific evidence has been presented which would indicate that this high ratio is not impeding the movement of traffic or restricting the area in which scrap can be obtained as contended by NARI. Since this traffic is a relatively insignificant part of the southern carriers total tonnage or revenue we conclude that a reduction in rates of 5 percent will not adversely affect the financial status of these carriers and that such a reduction is necessary to establish a just and reasonable rate structure.⁶⁰

Aluminum residues as in the other territories, have a high ratio (213) in the West. The CMSP was the only carrier to show the tonnages transported. These have varied up and down with peaks in the years 1973 and 1974. This makes a direct correlation between rate increases and the amount of traffic moving by rail difficult. However, respondents have not presented clear and convincing

⁵⁹The 1-percent waybill sample for 1975 multiplied by the appropriate weighing factor shows revenue for this commodity of \$878,465. The reduction will, therefore, amount to a \$131,769 loss in revenue.

⁶⁰In the South, the 1-percent waybill sample for 1975 multiplied by the appropriate weighing factor shows a revenue of \$1,164,016 for this commodity. The reduction will result in a revenue loss of \$58,200.

evidence that the movement of this traffic has not been significantly affected by freight rates increases. We cannot conclude otherwise based on the tonnages presented by one western road. We, therefore, conclude that this rate structure, in light of the value of the commodity, exceeds the maximum level of reasonableness, and that a reduction in rates of 20 percent is necessary.⁶¹

The TEA did supply data showing the total amount of nonferrous metals (aluminum, copper, and tin scrap), originated territorially for the period 1966 through 1974 (excluding tonnage originated by the Detroit, Toledo and Ironton Railroad). This shows that the amount of nonferrous scrap originated in the East has been declining; that the amount of nonferrous scrap originating in the South has been increasing; and that scrap in the West has fluctuated up and down. Although this has some probative value as to the tonnage originated for all nonferrous scrap and whether overall, general increases may have an effect on their movement, the aggregation of commodities prevents an analysis of the trend for each type of scrap.

For aluminum or alloy scrap, in the East, the ratio (177) is within the zone of reasonableness. The commodity has a high value, and the ratio of rate to price has remained steady. Again, we reprimand respondents for not showing the specific amount of this nonferrous scrap moving. However, in view of the ratio, the value of the commodity, and the financial needs of the eastern carriers, we find that the rate structure is just and reasonable.

Our ratio for aluminum scrap in the South (184) does not appear to be above the maximum level of reasonableness, although it is the highest ratio for this commodity in all the territories. Considering the value of the commodity, the ratio of rate to price, and the other evidence of record, we find that the rate structure on aluminum scrap is just and reasonable.

In the West, the ratios for aluminum or alloy scrap (161) is within the zone of reasonableness considering the value of the commodity. Although the exact amount of this traffic moving over the years was not given by the western carriers the total tonnage for nonferrous scrap indicates that there are fluctuations up and down in the amount of traffic handled, with no discernible decline. This ratio also appears reasonable when compared to the ratios for the same commodities in the other territories.

The AAI shows, based on a comparison of the wholesale price index of all commodities, and industrial commodities, with the

⁶¹In the West, the 1-percent waybill sample for 1975 multiplied by the appropriate weighing factor shows a revenue of \$372,799. The reduction will result in a revenue loss of \$18,639.

estimated rate index of alumina and scrap, that rates on alumina and scrap have increased at a higher percentage than the wholesale price index for other commodities, and alumina rates having increased more than those on scrap. However, the increase is not that excessive.

We agree with NARI that although the recovery of aluminum scrap may be increasing tonnage wise, that the production of scrap as a percentage of the Nation's metals consumption has remained stagnant or declined. For the period 1961-1974, the percentage has hovered within one or two points of 20 percent.

However, the Southern Railway shows that for cast aluminum and aluminum clippings, the ratio of rate to price is very low, there being no evidence of a steady increase in the ratio of rate to price, but a fluctuation in the ratio as the price of scrap varies with demand. This supports the conclusion that rail freight rates have had no detrimental effect on the recycling or movement of aluminum scrap by rail.

Miscellaneous nonferrous metal residues have a ratio of 319 in the East compared to 173 in the West. No information was presented as to the value of this residue, the ratio of rate to price, or the amount of tonnage originated or handled in the East over a period of years. There is no evidence presented which supports this high ratio especially when compared to the ratio of 177 on aluminum or alloy scrap in the East. Since little or no evidence was presented as to the effect of rates on the movement of this commodity, we conclude that this rate structure is unjust and unreasonable and should, therefore, be lowered by 20 percent.⁶²

In the South, no movements of miscellaneous nonferrous metal residues were presented. This fact plus the lack of data presented on this commodity by the southern carriers, and the low tonnages handled by the reporting carriers in 1975 indicates that very little of this traffic is moving. Without data or movements it is difficult to determine what the rate structure for this commodity is and, therefore, we cannot make a finding as to its reasonableness. Therefore, we will order a further investigation into the rate structure of miscellaneous nonferrous metal residues in the South.

In the West we conclude that the ratio on miscellaneous nonferrous metal residues of 173 is within the zone of reasonableness and that the rate structure thereon is just and

⁶²The 1-percent waybill sample for 1975 has no movements of miscellaneous nonferrous metal residues for any of the territories. This indicates that very little traffic is moving and, therefore, a reduction in rates will not have an adverse effect on respondents.

reasonable. The ratio is relatively close to the ratio on aluminum or alloy scrap (161) which is an indication that it does not have an unduly high transportation burden. Again we do not have data on the amount of tonnage moving by western carriers over a period of time. However we believe that the rate structure has not been shown to impede or affect the movement of traffic on this commodity.

For ashes, the ratio in the East is 343 compared to 118 in the South and 183 in the West. The East is, therefore, disproportionate to the other territories. Ashes appear to be a very low valued commodity, although the exact value is not known, and it is, therefore, less able to bear a high ratio and still move. This conclusion is supported by the fact that the tonnage originated for this commodity has been declining in all territories from 1966 through 1974 with some fluctuations upward in the interim. Otherwise, the issue of the effect of freight rates on this commodity was not specifically addressed by respondents. In light of the ratio of 343 in the East and the decline in the movement of this commodity, we find that the rate structure is unreasonable and that the rates should be lowered. We realized that the eastern carriers are in financial difficulties, however, the percentage of this traffic to its total traffic is not great, and a rate reduction of 20 percent should encourage a greater movement by rail which will overall increase the carriers' revenue.⁶³

In the South, the ratio is 118 which is relatively low. However, we note that the amount of ashes being transported has declined steadily since 1966 although the amount of tonnage originated was never more than 51,000 tons a year. This factor in light of the low ratio however does not mean that the rates are impeding the movement of traffic. Other factors could be the cause of the decline. We conclude, therefore, that the rate structure on this commodity is not unjust, unreasonable or discriminatory.

In the West, the ratio is 183. The amount of tonnage moving by the western roads has generally declined steadily since 1966. No evidence was presented to explain this decline. Considering the low value of this commodity, we conclude that the rate structure is impeding the movement of traffic and that it should be altered downward. Since it is a small portion of the western carriers' traffic, such a reduction will not adversely affect their financial status, and in fact should produce greater revenues as more traffic is attracted

⁶³The eastern respondents show that the gross revenue for ashes in 1974 was \$478,000. The reduction will, therefore, result in a loss of revenue of \$95,600.

to the railroads.⁶⁴ We therefore order a reduction in rates of 10 percent in the West.

In conclusion we find: (1) That the rate structures on aluminum residues is unjust and unreasonable in the East, South, and West, and that the rates should be lowered by 15 percent in the East, 5 percent in the South, and 20 percent in the West; (2) that the rate structure on miscellaneous nonferrous metal residues is unjust and unreasonable in the East, and that rates should, therefore, be lowered 20 percent; (3) that the rate structure on ashes is unjust and unreasonable in the East and West, and that the rates should be lowered by 20 percent in the East, and 10 percent in the West; and (4) that further investigation into the rate structure of miscellaneous nonferrous metal residues in the South is required as set forth in our "General Discussion and Conclusions" hereafter.

COPPER ORES, COPPER MATTE AND RESIDUES, AND BRASS, BRONZE, COPPER OR ALLOY SCRAP (STCC NOS. 10, 2, 33, 312, AND 40 212)

The following is a discussion of the virgin material copper ore and the potentially competitive recyclable materials of copper matte and residues, and brass, bronze, copper, or alloy scrap.

First, we will discuss the collection, processing, and markets for these materials.

Copper Scrap.—Copper scrap⁶⁵ consists of new (home and prompt) and old scrap. Home scrap is usually completely recycled at the manufacturing plant. Prompt scrap, which consists of random pieces remaining after the fabrication of virgin copper into bars, sheets, or ingots and is of a high quality and known metallic content, is generally sold to scrap dealers and completely recycled. Lastly, there is obsolete scrap which is recovered from products that have served their useful lives. This generally comes from automobiles, ships, and industrial equipment. Where large amounts of scrap are readily available, there are great incentives to recycle. For example, 91 percent of the obsolete scrap in automobile radiators and 88 percent of the copper scrap in railroad boxcars is recycled. However, commodities which are widely dispersed and contain small amounts of copper scrap, are difficult to recover because of the high labor costs incurred to collect and sort the scrap. This

⁶⁴The respondents reported revenue of \$208,000 for ashes in the West. The reduction will, therefore, result in a revenue loss of \$20,800.

⁶⁵The discussion of the copper scrap and copper ore collection and processing is based on information contained in the Gordon Study, *supra* Mineral Facts and Problems, 1970, *supra*, the Mineral Yearbook, 1973, *supra*, the FEIS in Ex Parte No. 319, and the submissions of the parties.

would include commodities such as copper wire and tube which is used in refrigerators and air conditioners, magnet wire which is used in small motors, cartridge brass, and other brass mill products.

Scrap collection and processing.—According to the Gordon Study,⁶⁶ there are: (1) over a 1,000 collectors and wholesalers engaged in the recovery of scrap; (2) several hundred foundries; (3) 80 ingot makers and secondary smelters; (4) 50 brass mills; and (5) 12 primary producers and custom refiners. The scrap is collected by individuals and small groups and generally moves to the scrap dealers by truck. The dealer cleans and sorts the scrap which is a labor intensive operation because the material requires handling and rehandling and careful inspection. Once the scrap is recovered, graded and sorted, 99 percent of it moves by rail to the consumer.

There are four grades of scrap. The highest grade is "No. 1 Wire" or "No. 1 Heavy Copper," which is free of contaminants and needs little more than remelting to be made into refined copper by a custom smelter of brass mills and foundries. "No. 2 Copper Scrap" is 80- to 95-percent copper. It is refined in a reverberatory or rotary type furnace and then cast into saleable copper ingots of "fire refined" grade or into anodes for further treatment in an electrolytic tank house. The third grade consists of cleaned and graded copper-base alloy scrap which is made into specification ingots of brass, bronze, gun metal, aluminum bronze, et cetera, by ingot makers. If particularly well cleaned and sorted and of known composition, it can be used directly by fabricators such as brass mills. Dilution of molten scrap with minor additions of virgin metal and high-grade scrap, is sufficient to obtain the desired alloy composition. If impurities are present, the metal can be refined with various fluxing agents. Finally, there is low grade copper scrap which consists of refinery slags, drosses, and skimmings which contain as little as 15 percent copper. They can be smelted in a blast furnace to yield blister copper. Custom refineries are the primary consumers of this low-grade material.

Production of copper ore.—There are three stages involved in the processing of primary copper from copper ore: Concentrating, smelting and refining. In the concentrating stage, raw ore with a metallic content of less than 5 percent is concentrated into a product of a higher metallic content (25 percent) by the flotation method,⁶⁷ or hydrometallurgical method.⁶⁸ The concentrates are

⁶⁶*supra*, p. 123.

⁶⁷Sulfide ores are ground into fine particles which are then mixed with lime, water, oil, or alcohol and other chemicals. The concentrated ore then floats to the top and is recovered.

⁶⁸Nonsulfide ores are mixed with sulphuric acid to dissolve or leach out the copper.

then taken to the smelter where silica, sulphur and iron impurities are removed by fluxing materials.⁶⁹ The copper is then melted in a reverberatory furnace. In the next stage called the converting stage, the slag is removed and the relatively pure copper (blister copper) is transferred to a holding furnace and then to a poling furnace for fire-refining or casting into anodes for electrotypes. At the refining stage, remaining metallic impurities are removed and the metal is cast into forms. This is then subject to a refining process for further purification which is accomplished by fire refining where impurities are oxidized to produce a slag by-product, or electrolytic refining.

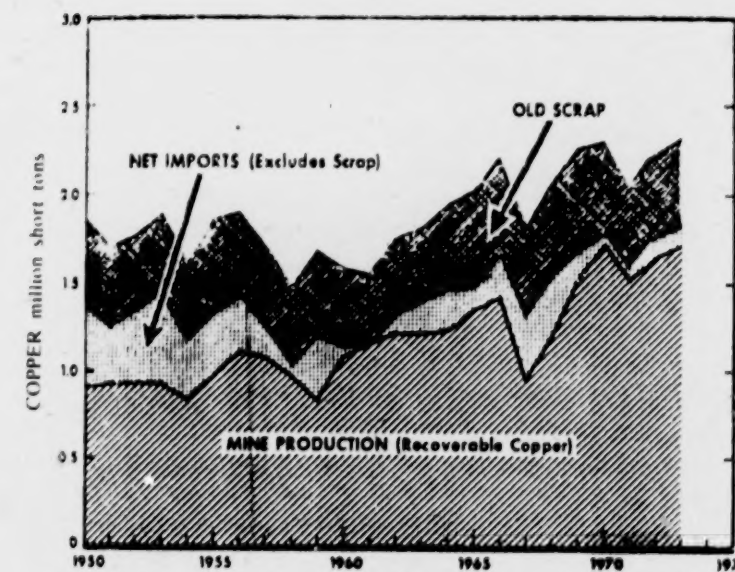
According to FEIS, scrap can be used instead of virgin material in the smelting or refining of copper ore, and in some cases, high quality scrap can be used in the fabrication stage competing directly with primary metal.

Eighty percent of primary copper produced in the United States is from domestic ore mined in open pit strip mines. The principal copper producing States are Arizona (54 percent), Utah (15 percent), New Mexico (12 percent), Montana (8 percent), Nevada (5 percent), and Michigan (4 percent). These six States accounted for 98 percent of the total production. Domestic mine production of recoverable copper in 1973 was 1.72 million tons, an increase of 3 percent and only slightly below the record high of 1970.

Supply.—According to the *Minerals Yearbook, 1973*, 1,717,940 short tons of copper ore, having a value of \$2,044,349, were produced by domestic mines. Smelters processed 1,705,065 short tons. Secondary copper recovered from old scrap only amounted to 441,841 short tons. Domestic recovery of copper in all forms from all classes of purchased scrap totaled 1.36 million tons in 1973 which represented a 5-percent increase from 1972 and the largest quantity since 1969. Brass mills accounted for 47 percent of the recovered copper, primary producers for 25 percent, and secondary smelters for 22 percent. The remaining 6 percent was reclaimed at chemical plants, foundries, and manufacturers. The following graph shows the tonnage of copper from domestic mines, foreign imports, and scrap sources:

⁶⁹*Minerals Yearbook, 1973, supra, p. 460.* At this stage, copper and iron unite with sulfur to form sulfides known as copper matte. The matte can have a copper content between 10 and 50 percent, with 40- to 45-percent copper content being the most common. It also contains other metallic impurities. *Mineral Facts and Problems, 1970, supra, p. 540.*

TABLE 49



Sources of copper supply for United States copper consumption.

Source: *Minerals Yearbook, 1973, supra, p. 461.*

The following table shows the amount of copper recovered as refined copper in alloy and in other forms from copper-base scrap processed in the United States:

356 I.C.C.

TABLE 49A

Copper recovered as refined copper, in alloys and in other forms from copper-base scrap processed in the United States

(SHORT TONS)

Recovered by—	From new scrap		From old scrap		Total	
	1972	1973	1972	1973	1972	1973
Secondary smelters.....	64,135	68,652	229,322	218,903	293,457	287,555
Brass mills.....	535,643	562,291	32,435	44,500	568,078	606,791
Foundries and manufacturers.....	17,797	20,434	40,639	46,121	58,436	66,555
Chemical plants.....	533	649	2,557	2,730	3,090	3,379
Total.....	829,819	856,132	451,490	435,109	1,281,309	1,291,241

Source: *Minerals Yearbook, 1973, supra, p. 480.*

Production of refined copper from primary materials was 1.87 million tons in 1973, a slight decline from the record high set in 1972. Refined copper produced from scrap rose to 465,100 tons from 423,234 tons in 1972. Total production of refined copper in the United States in 1973 was 2.33 million tons, derived 80 percent from primary and 20 percent from scrap sources.⁷⁰

Primary producers consumed principally the following types of scrap: No. 1 wire and heavy copper, No. 2 wire, mixed heavy and light, refinery brass and low-grade scrap and residues. Approximately 310,275 short tons was new scrap compared to 293,555 short tons from old scrap in 1973. Secondary smelters consumed the same types of scrap (except refinery brass), in addition to other categories of obsolete scrap. Their consumption of the three types of scrap was 76,123 short tons from new scrap and 88,580 short tons from old scrap in 1973.⁷¹ The total consumption of these types of scrap in 1973 were 652,098 short tons of new scrap and 455,888 short tons of old scrap.

Demand.—The fabricating industry consists of electrical wire and cable manufacturers, copper and brass fabricators, and brass and bronze foundries. These foundries are the chief consumers of alloy ingot produced out of copper-base scrap. Brass mills which make industrial products such as boilers, condensers, ship propellers, faucets and artillery cases, and other fabricators are substantial consumers of selective grades of scrap, as well as secondary refined copper. The demand for scrap fluctuates based on the needs of smelters, refiners and primary producers.

The consumption of purchased copper-based scrap in 1973 was 86 million tons which consisted of 63 percent new scrap and 37 percent old scrap. The consumption of refined copper rose 7 percent to 2.40 million tons, wire mills consuming 68 percent, brass mills 30 percent, and 2 percent miscellaneous. Forty-nine percent of the copper consumed in the United States in 1973 was from recycled copper.

Copper and its alloys are used in, for example, electrical equipment and supplies, construction, transportation, communications, appliances, utensils, and jewelry. According to Gordon, with proper sorting and processing, almost any type of copper scrap regardless of its condition or degree of contamination

⁷⁰About one-half of the old scrap is consumed for the production of refined copper, and the other one-half is used largely in the production of brass and bronze ingot for foundry consumption.

⁷¹*Minerals Yearbook, 1973, supra, p. 482.*

can be reclaimed and used to produce secondary copper metal which is perfectly substitutable for primary metal. However, because the degree of processing requirements and costs depend on copper content, alloy and impurities, each user tends to prefer more of certain types of scrap than others.

PART IA

MOVEMENT OF RECYCLABLES AND VIRGIN MATERIALS

WRA contends that the copper ore originates at a limited number of origins and moves to a few destinations.

There are relatively few movements of copper ore or scrap in the South, and there are no movements of copper ore in the East.

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the TEA, SFA, and WRA. The number of movements shown includes both inter- and intrastate traffic.

TABLE 50

Average ratio of revenue-to-variable cost (percent)¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Virgin commodity</i>						
10 2—Copper ores.....		0		0	162	23
<i>Recyclable commodities</i>						
33 312—Copper matte, etc....	204	3		0	281	10
40 212—Brass, bronze, copper or alloy scrap.....	186	33	211	6	226	25

¹Average reflect weighted average ratio of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harrity of Western Railroad Association.

Comparison of respondents' revenue-variable cost ratios—

1. *Copper matte, et cetera (33 312) v. copper ores (10 2).*—This comparison can be made only in the West because there are no movements of copper ores in the East or South. The comparison in the West shows a significantly higher ratio for the recyclable

356 I.C.C.

commodity (281 percent) than for the virgin commodity (162 percent).

2. *Brass, bronze, copper or alloy scrap, et cetera (40 212) v. copper ores (10 2).*—This comparison can be made only in the West. It also shows that the ratio for the recyclable commodity (226 percent) is higher than the ratio for the virgin commodity (162 percent).

Opposing shippers.—NARI criticizes the results of the respondent railroads in two respects: (1) The respondent railroads did not make adjustments to switch engine minutes, and way train ton-mile costs for movements of copper ore in the West. Such adjustments were made to the movements of copper ore in the West in the 1972 "Burden Study," published by the Interstate Commerce Commission; (2) the railroads display their results improperly by presenting these ratios by individual commodity groups of related and competing commodities.

NARI groups the respondent railroads' results and redisplay these results for the western territory, weighting such results according to the carloads of each commodity taken from the 1974 DOT 1-percent waybill sample. The ratios are shown only for the West as there were no movements of copper ore in the East or South. Those results are shown below:

Ratio of revenue-to-variable cost for copper (percent)

Territory	Virgin	Recyclable
West.....	158.3	225.0

NARI's results show that the ratios of revenue to variable cost, when weighted appropriately by the 1-percent sample, are higher for the recyclable commodities.

356 I.C.C.

172d

TABLE 51

Commission's adjustment of respondents' revenue-variable cost ratios

AVERAGE RATIO OF REVENUE TO VARIABLE COST (PERCENT)¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Virgin commodity</i>						
10 2—Copper ores.....		0		0	150	18
<i>Recyclable commodities</i>						
33 312—Copper matte, etc----	189	4		0	237	8
40 212—Brass, bronze, copper or alloy scrap----	191	32	206	12	215	17

¹Based on interstate movements only.**Comparisons of Commission's revenue-variable cost ratios**

1. *Copper matte, et cetera (33 312) v. copper ores (10 2).*—Since there are no movements of copper ore in either the East or South, this comparison can be made only in the West, where the ratio for the recyclable commodity (237 percent) is substantially higher than the ratio for the virgin commodity (150 percent).

2. *Brass, bronze, copper, or alloy scrap, et cetera (40 212) v. copper ores (10 2).*—This comparison shows that the recyclable commodity has a ratio (215 percent) which is substantially higher than the ratio for the virgin commodity (150 percent). As in (1) above, this comparison can only be made in the West.

Comparison of Commission's results with respondents' results.—In general, the ratios shown above are lower than those shown by respondents. The number of movements of brass, bronze, copper or alloy scrap we have in the South is greater than the number of movements shown by respondents. This is due to the fact that six movements of this commodity submitted by the western railroads were originated by southern railroads. These movements were included in the Commission's showing for the South and removed from the West.

In summary, the following table best illustrates the comparison between revenue-to-variable cost ratios for virgin commodities and recyclable commodities:

356 I.C.C.

173d

TABLE 52

Average ratio of revenue-to-variable cost (percent)

	East		South		West	
	Respond- ent	Commis- sion	Respond- ent	Commis- sion	Respond- ent	Commis- sion
<i>Virgin</i>						
10 2—Copper ore.....					162	150
<i>Recyclable</i>						
33 312—Copper matte, etc....	204	189			281	237
<i>Virgin</i>						
10 2—Copper ore.....					162	150
<i>Recyclable</i>						
40 212—Brass, bronze, cop- per or alloy scrap....	186	191	211	205	226	215

Discussion and conclusions relative to shipper comments.—NARI cites respondents' failure to adjust the costs for movements of copper ore in the West by making adjustments to switch engine minutes and way train ton-mile costs. These adjustments are made in the "Burden Study,"⁷² published by the Commission. These adjustments are proper and are made to reflect economies present in movements of copper ore. Such movements were considered to be principally multiple-car movements and the adjustments were made to reflect the economies inherent in such movements. However, the evidence of record in this proceeding indicates that the movements of copper ore are single-car movements. Because of this evidence, no adjustments have been made to the costs.

NARI attempts to redisplay the results of the respondent railroads, using the relative weights of each commodity from the 1974 DOT 1-percent waybill sample. While agreeing that weighting of the cost data for two or more commodities for comparative

⁷²Rail Revenue Contribution by Commodity and Territory for the Year 1972, Statement No. 153-72.

purposes has merit, the method used by NARI is suspect. The data of record is not the result of a statistical sample. There is no basis for assuming that the same consist of traffic movements exists in the data of record as in the 1-percent waybill sample. In the absence of more complete data weighting cannot be performed properly.

PART I B

TRANSPORTATION CHARACTERISTICS

Respondents.—No special equipment is needed to move copper matter, speiss, or flue dust, however, because of its high value, it is necessary to use extra security measures to prevent theft. These commodities are carried in assigned gondolas constructed with special openings for unloading. They move in assigned service.

Copper ore or concentrates have short movements from the mine to smelter, generally in private carriage either rail or truck. The majority of the moves are in the West, with small movements in the South and none in official territory. Unlike iron ore, copper ore has a metallic content of between 0.6 and 0.7 of 1 percent, and the price does not exceed \$5 to \$6 per ton. Therefore, the ore is concentrated in facilities located near the mines.

Ores and concentrates originate in mountain Pacific territory and Michigan. The ores load heavy and move in general service gondolas and in open hopper cars, and also in special equipment, assigned air drop bottom gondolas.

Opposing shippers.—Commercial Metals Company (CMC), on behalf of NARI, states that copper scrap is moved predominantly by rail in ordinary boxcars at the maximum weight allowed by tariff. No special service is required. Claims and shipping problems are also kept to a minimum. The scrap is unloaded by the consignee and the railcar is released to the railroad for immediate use carrying other materials. Copper ores, precipitates, and concentrates, on the other hand, often move in open gondola cars. When used in a long haul to a refinery, the gondola cars are unloaded, and quite often they must be returned empty, with resulting loss of revenue to the carrier.

Continuous processing, packaging and shipping improvements have increased the handling and loading of scrap. Five years ago 80,000 pounds of copper scrap in a 50-foot boxcar was an accomplishment whereas today it is not unusual to load 120,000 pounds per car. Balers which previously compressed bales of 2,000

356 I.C.C.

pounds now can compact bales ranging from 3,000 to 6,000 pounds. The loading of briquetted copper wire has also increased loading.

Discussion and conclusion relative to shipper comments.—CMC cites several operating factors which made the transportation of copper scrap advantageous to the railroads compared to the transportation of copper ore. With regard to the various operating factors cited by CMC, the following comments apply:

1. CMC cites the use of different car types for the virgin and recyclable commodities and also cites the fact that boxcars used in the transportation of copper scrap can be used for the movement of other traffic rather than returned to the shipper as in the case of gondolas. The use of specific car type is reflected in the Commission's adjusted ratios of revenue to variable cost, inasmuch as the different costs associated with different car types are introduced. Such costs by car type include different empty-return ratios which reflect the general operating characteristics for that type of car. The fact that a boxcar is released for immediate use for any other material while a gondola is often returned to the shipper empty is reflected in lower empty-return ratios for boxcars.

2. CMC cites the fact that cars of copper scrap are loaded up to the maximum weight allowed by the tariff. If this is true, it will be reflected in the carload weight and in the cost of the movement.

3. CMC cites factors such as quick loading and unloading, sealing of the car, and billing by the company instead of the railroad and the lack of the need for special services or equipment as being cost factors which are advantageous to the railroad.

To the extent that such factors as quick loading and unloading by consignee, billing by the company and reduction in special services result in reductions in cost to the carrier, such factors should be taken into consideration and the costs of the movement adjusted accordingly. However, CMC has offered no data in support of these contentions.

PART II

Respondents.—The Southern Railway supplied a table comparing the price of copper scrap to the average rates. It indicates that the average rail rate has never been as much as 3 percent of the copper scrap price. Refinery buying prices for copper scrap increased 82 percent, or \$609.40 per net ton since 1967. The average rate increased \$8.62 per ton or 1.4 percent of the price rise.

356 I.C.C.

176d

TABLE 53

Copper scrap (STCC 40 212)

(IN DOLLARS PER TON)

Year	Prices		Average rate	Ratio rate to price	
	Dealers' number 2 heavy (¹)	Refinery buying prices for number 2 (¹)		Dealers' number 2 heavy	Refinery buying prices for number 2
1974	\$1,097.60	\$1,355.00	\$18.89	1.72	1.39
1973	1,004.40	1,204.00	15.67	1.56	1.30
1972	780.40	627.60	16.64	2.13	2.65
1971	551.40	768.60	15.23	2.76	1.98
1970	789.00	983.80	11.32	1.43	1.15
1969	857.60	982.60	7.12	.83	0.72
1968	655.20	774.60	11.00	1.68	1.42
1967	663.00	745.60	10.27	1.55	1.38
1966	893.20	1,001.80	10.69	1.20	1.07
1965	689.80	778.20	12.38	1.79	1.59

¹Based on monthly averages of dealers' and refiners' buying prices at New York, compiled from daily quotations published in *American Metal Market* in cents per pound converted to net tons.

²Based on Metal Scrap STCC No. 40 21 (Metal Scrap) Minus STCC No. 40 211 (Iron and Steel Scrap). Based on total tons originated.

Respondents also showed the tonnages originated or handled for the involved commodities.

The following table shows these amounts for the period 1970 through 1975.

356 I.C.C.

177d

TABLE 54

Copper scrap, matte, and ore (STCC Nos. 40 212, 33 312, and 10 2)

TONNAGE CARRIED (1970-1975)

Territory	Carrier	STCC	1970	1971	1972	1973	1974	1975
West	DRGW	40 212	1,893	1,466	1,853	2,891	2,175	2,114
	MILW		25,282	15,415	21,445	36,643	34,597	20,324
	MP		44,705	36,309	33,074	45,368	41,344	22,720
	SP			2,040,493	2,030,684	2,285,495	2,570,387	2,204,398
	UP		46,027	36,967	44,581	42,277	38,282	30,612
West	DRGW	33 312	0	60	158	0	21	0
	MILW		1,425	683	1,541	2,013	2,436	1,672
	MP		12,877	14,743	16,075	20,487	17,122	19,460
	SP		N/A	856,034	978,237	946,412	774,859	725,076
	UP		18,176	18,345	9,353	3,190	3,917	5,790
West	10 2	CMSP	0	1,277	7,092	12,290	8,176	3,515
		DRGW	50,882	24,886	53,691	54,125	12,104	3,325
		SP	9,256,950	9,256,950	10,250,813	11,262,214	10,769,038	6,678,579
South	UP		95,559	136,762	110,711	126,239	123,317	146,611
	10 2	South District	6,269	45	299	20	160	

356 I.C.C.

178d

Opposing shippers.—NARI contends that the utilization of secondary scrap copper has decreased from 1966 through 1975, as shown below. It is noted also that the prices for copper scrap, virgin refined copper, and the consumption of refined copper has also declined.

TABLE 55

U.S. consumption and average price of refined copper and scrap copper

	Refined copper (1,000 short tons)	Refined copper (cents per pound)	Scrap copper (1,000 short tons)	Scrap copper (cents per pound)
1966-----	2,876	36.00	990	50.09
1967-----	1,984	38.10	869	37.28
1968-----	1,878	41.17	938	38.73
1969-----	2,150	47.43	1,038	49.13
1970-----	2,051	58.07	895	49.19
1971-----	2,021	52.09	948	38.43
1972-----	2,238	51.44	1,043	31.38
1973-----	2,448	59.53	1,055	60.20
1974-----	2,199	77.06	968	67.75
1975-----	1,539	64.53	798	41.12

Source: American Metal Market "Metal Statistics 1976."

NARI also presented a table showing the history of general increases on virgin copper ore and concentrates and recyclables.

TABLE 56

Rate disparity and impact of rate increases

Ex Parte No.	Copper scrap (STCC 40212)		Copper ore and concentrate (STCC 103)		
	Increases per hundred-weight	Rate in cents per hundred-weight (¹)	Increases per hundred-weight	Rate in cents per hundred-weight (¹)	(¹)
	<i>Cents</i>		<i>Cents</i>		
223-----	1	NA ⁴	84	1/2	NA ⁴ 66
	<i>Percent</i>				
256-----	3	67 1/2	87	2	44 1/2 68 356 I.C.C.

179d

Rate disparity and impact of rate increases—Continued

Ex Parte No.	Copper scrap (STCC 40212)		Copper ore and concentrate (STCC 103)		
	Increases per hundred-weight	Rate in cents per hundred-weight (¹)	Increases per hundred-weight	Rate in cents per hundred-weight (¹)	(¹)
	<i>Percent</i>		<i>Percent</i>		
259-B-----	5	71	91	5	46 1/2 71 1/2
262-----	6	75	96	6	49 1/2 76
265-B-----	6	80	102	6	57 1/2 80 1/2
267-B-----	11	89	113	12	59 90
281-B-----	3	92	116	4	61 1/2 94
295-B-----	3	95	119	3	63 1/2 97 1/2
299-B-----	2.8	98	122	2.8	65 100
303-B-----	4	102	127	4	68 104
305-A-----	3.3	105	131	3.3	70 107 1/2
305-RE-----	10	115	144	10	77 118 1/2
310-A-----	(¹)	(¹)	(¹)	7	82 127
313-----	5	121	151	5	86 133
313-----	2.5	124	154	2.5	88 136

¹No increase.

⁴Western territory.

⁵Southern territory.

⁶Not available.

Source: Denenholz and Janer, Inc., appendix C 1-4.

The Southern Railway's data indicates that in the South, Ex Parte No. 267-B was 6 percent increase, not 11 percent increase as shown above; that there was no increase under Ex Parte No. 281-B; and that the increase under Ex Parte No. 313 was only 2.5 percent. It also shows the rates to be substantially lower, starting at 52 cents at the Ex Parte No. 256 level.

From Ex Parte No. 223 through Ex Parte No. 313, the net or difference between the rate structures on copper scrap and copper ore and concentrates has grown from 23 cents to 36 cents per hundred pounds in the West, argues NARI, while the South has remained constant according to this table. The value of this table is questionable. It indicates that the same increases were applied in the South and in the West during this period and yet the disparity grew in the West but not in the South. This is unexplained. In all probability the South imposed lesser increases than authorized in the form of holdowns or made subsequent reductions in the rates.

356 I.C.C.

NARI also submitted the following table to illustrate the disparity in revenue per car for three shipments each of copper ores and concentrates and scrap:

TABLE 57

Sample	Commodities	Car miles traveled	Car tons	Revenue per car
I	Copper ores and concentrates	289	81.3	\$699.18
Do	Copper scrap	286	60.0	816.00
II	Copper ores and concentrates	1,508	92.2	2,032.09
Do	Copper scrap	1,490	51.6	3,364.32
III	Copper ores and concentrates	2,468	79	2,344.00
Do	Copper scrap	2,430	70.7	4,806.89

CMC is an international processor and trader of metallic raw materials, dealing primarily in recyclable metal. Freight rates, it contends, are a large influence on the viability of its business or an individual transaction.

First it indicates that it operates under a very low margin of profit of approximately 1.6 percent after taxes. Its average product sale on nonferrous scrap is approximately \$700 per ton, this means a profit of \$22 per ton before taxes. Outbound freight rates from its plants are about \$32 a ton which threaten to make its business unprofitable. In fact, it is indicated that it can ship by water to Europe and the Far East for less than it can ship by rail from the West Coast to Detroit, Cleveland, or New York. Freight rates, therefore, have an effect on where the commodity will be marketed. General increases, it is alleged, have also curtailed rail movements, in some instances a decrease of 5 percent.

Rebuttal.—TEA argues that NARI is incorrect in comparing price data of primary metal and nonferrous scrap although it concedes that data on the price of copper ores and concentrates is unavailable. The value of the crude ores/concentrates have a value per pound which is only a slight portion of the refined metal value. The data presented by NARI, TEA contends, only shows that primary metal prices rise with increased costs of mining and refining, whereas scrap prices are based on market supply and demand.

PART III

SENSITIVITY OF RECYCLABLE MATERIALS TO CHARGES IN
TRANSPORTATION RATES

Respondents.—The Gellman study notes that the prices for different grades of scrap vary considerably in the short run. Given a relatively stable short-run supply curve, the demand curve for obsolete copper scrap shifts in the short run. The reasons given for this shift are that:

(1) secondary scrap can technologically produce a secondary metal which is substitutable for primary metal. Therefore, domestic scrap copper tends to follow the London Metal Exchange prices for copper;

(2) the needs of smelter/refineries and primary producers can be satisfied from obsolete scrap copper and when shortages occur in primary metals, additional scrap is utilized; and

(3) the consumption of scrap by foundries and ingot makers is relatively stable and this, therefore, has some stabilizing influence on prices. The volatility in prices is caused by shifts in the demand curve. Thus, price elasticity of demand is not the relevant concept to consider with respect to the recyclability of obsolete scrap copper.

In the econometric analysis, the demand for scrap shifts over time and changes in price are largely due to the volatility in the demand elasticity is 0.379, which indicates that a 1-percent rise in obsolete prices would cause a 0.379 percent increase in demand. Gellman stated that the only reasonable interpretation of this market behavior is that the elasticity of demand is zero. Therefore, the positive coefficient for price and resulting price elasticity estimates are due to shifts in the demand curve. The only other explanation offered is that it is a "Giffen good." That is, the demand varies directly with price so that demand is positively priced. This would mean an increase in price causes an increase in demand.

If the elasticity of demand is zero, then an alteration of the rail rates will not affect the movement of obsolete scrap copper. If elasticity is "Giffen good," then an increase in transportation rates will increase demand which seems extremely unlikely. From this it is concluded that rail rates have no effect on the demand for copper scrap.

Any copper which is not recycled, states Gellman, must be contained in products which are widely dispersed and, therefore, difficult to process. From this it is concluded that there is very little supply elasticity with respect to price. An increase in scrap supply with respect to price could occur because of previous increases in copper production. This implies that the supply curve would shift to the right over time.

Using an econometric equation, it was concluded that supply does increase as price increases. However, the price coefficient indicates that the supply elasticity is approximately 0.30. Therefore, in the period of 1948 through 1969, an increase of 1 percent in constant dollars of the price of scrap would bring forth an increase in supply of secondary copper recovered from obsolete scrap of approximately 0.3 percent.

Opposing shippers.—NARI contends that copper virgin ores and concentrates are competing raw materials with recyclable copper scrap and residues in the production of fabricated metals and metal products. This is established by the fact that in 1973 approximately 49 percent of the copper consumed in the United States each year is recycled. In the Battelle Study,⁷³ it is also stated that most applications for copper can be supplied by secondary or primary metal; the choice of which one to use depending on price. Primary producers of copper also purchase unalloyed copper scrap and upgrade it to produce new refined products.

If the allegedly discriminatory and unjust and unreasonable freight rates are eliminated, NARI predicts that the recycling volume of copper, lead and zinc will increase 30 to 40 percent by 1986.

PART IV

EFFECTS ON INDIVIDUAL RAILROADS

The amount of copper ore and scrap tonnage transported by various railroads and districts and the percentage of the traffic to total tonnage or revenue is shown below. The transportation of these commodities is relatively small in comparison to total revenue and tonnage.

⁷³"A Study to Identify Opportunities for Increased Solid Waste Utilization," by Battelle Memorial Institute.

TABLE 58

(STCC Nos. 33 312 and 40 212) Percentage of tonnage or revenue of involved commodities to total carrier tonnage or revenue (1975)

Territory	STCC	Carrier	Carloads	Tonnage carried	Revenue from commodity	Percent to total tonnage	Percent to total revenue
East	40 212	BLE		40,000		0.031	0.0093
		ConRail		46,000		0.045	0.041
		Chessie		88,000		0.067	0.097
		PLE		150		0.00182	
South	33 312	ConRail	84				
		Frisco		118	1,782		
	40 212	ICG	5		4,627		
		SCL	183	29,969			
West	33 312	SOU	326				
		MILW	27	1,672	37,665		0.010
		MP	254	19,460	281,129		0.032
		SP	7,997	725,076	10,306,324		
	40 212	UP	80	5,790	105,027		0.011
		DRGW	39	2,114	22,943		0.016
		MILW	474	20,324	432,338		0.116
		MP	601	22,720	312,817		0.036
		SP	41,450	2,204,398	18,171,244		
		UP	653	30,012	398,487		0.040

PART V

ALTERNATIVE RATE STRUCTURES

Respondents.—WRA states that since all rates on copper ores and concentrates are point-to-point rates, they were developed to meet specific transportation needs and characteristics. As to brass and bronze scrap et cetera, it is concluded that, if disparities exist in areas of rates, the railroads will make specific adjustments in rates where they are needed and justified.

Opposing shipper.—CMC argues that, with the increased loading and compacting techniques in existence, rates based on an 80,000-pound minimum should be increased to 120,000-pound incentive rates. This would permit an increase in volume to areas being curtailed because of freight rates. The relief requested by NARI is that the ratio be lowered to 131.8 as described in the discussion of aluminum.

PART VI

OTHER EVIDENCE

Vulcan Materials Company and Proler International Corporation urge that iron or steel scrap (generally tin orterne-plate scrap) which is used for the purpose of copper precipitation be considered as a recyclable commodity. Copper precipitation is a method used by the copper industry to remove copper from poor ores and tailings. The low-grade ores or tailings are saturated with large amounts of water or weak sulfuric acid into which the copper dissolves and the copper-bearing solution is formed. The solution is then passed through cones or vats containing iron or steel scrap which has been detinned or shredded, or processed iron ore⁷⁴ where an iron exchange takes place and the iron is consumed into the solution. This precipitation yields a copper concentrate which is processed into metallic copper.

The definition of recyclable as used in the tariffs does not permit the iron or steel scrap to be classified as a recyclable since it requires that the commodity transported produce the same kind or previous state of the commodity transported. Dictionary definitions of the word recycle are not so limited, however. It is urged that "recycling" only requires that a waste commodity be made into a useful commodity. It is also pointed out that the use to which a commodity is put does not justify a difference in rates, without a difference in the commodity or its transportation conditions, of course, consideration of the use of an article is of value in a determination of its character.

It is, therefore, requested that iron or steel scrap, viz., terne-plate scrape, tin can scrap, semi-detinned, shredded, loose, or in bales, tin cans, detinned and shredded, tin cans, old, crushed, tin plate scrap, detinned, when for precipitation purposes, be defined as a recyclable.

As stated in the FEIS, it is very difficult to generalize about the net results on the quantity demanded of copper scrap caused by a change of one price variable holding all other variables constant. In the long run, the demand for pricing and secondary copper is potentially more elastic than in the short run. If the average transported rate for copper scrap is a small part of the overall price of scrap copper, and if in the short run the consumers of copper

⁷⁴Virgin ore can also be used, however, it must be processed to reach the "particulated" state used in the precipitation process.

scrap are price takers (inelastic response to price), the marginal changes in scrap transportation rates would have little effect on the quantities demanded. In the long run there would be greater substitutability. There may also be substitutability to virgin copper if transportation rates increase, however this is difficult to quantify.

Using an econometric analysis, as pointed out the FEIS a 10-percent rail freight increase would add \$2.23 to the average revenue per ton of scrap copper. This would cause a 0.04-percent decrease in demand in the short run. In the long run, however the results would be more severe as shown in the table below.

TABLE 59

Effect of changes in freight rates on old scrap consumption

SHORT-RUN IMPACT

Rail rate change	Percent effect on demand	Change in annual consumption
Percent		Tons
-20 .....	.09	+ 512
-10 .....	.04	+ 227
0	0	0
10	-.04	-227
20	-.09	-512

Long-run impacts

-20	0.4	+ 2275
-10	0.2	+ 1137
0	0	0
10	-0.2	-1137
20	-0.4	-2275

However, despite the long-run impacts the FEIS concludes, that changes in rail rates will have no significant effect on the environment.

DISCUSSION AND CONCLUSIONS

As in the case of other nonferrous metals, secondary smelters or other consumers of scrap, other than primary producers, do not consume copper concentrate in addition to or in lieu of copper 356 I.C.C.

scrap. Consumers of secondary scrap, which are not integrated with mine producing facilities, are restricted to the consumption of scrap because of the lack of an ore supply and the technical restrictions in the consumption of ore in their facilities. Therefore, the area where competition can potentially occur is at a primary producer's facilities.

The complexities of the primary and secondary copper markets make it difficult to determine if the two industries and their raw materials are complementary or substitutable. However, the evidence indicates that copper is more substitutable in production than most of the other metals.

As noted in our discussion of copper production, matte, or brass, bronze, or copper alloy scrap can be used by primary producers in the smelting and refining stage of copper ore processing in both the reverberatory furnace and the electrolytic tank house. Primary producers actually consumed more old and new scrap in 1973 than did the secondary smelters. This consumption of purchased scrap (which is in addition to home scrap) by primary producers is for No. 1 and No. 2 wire, refinery brass, and low grade scrap and residues. In 1973, the 603,830 short tons of this type of scrap consumed by primary producers accounted for 30 percent of total purchased scrap consumption and 55 percent of the consumption of this kind of scrap. The amount of scrap consumed by primary producers also varies from year to year. In some cases, high quality scrap can also be used in the fabrication stage competing directly with primary metal. Secondary copper and primary copper are also generally substitutable in most product applications.

The Gellman report states that, although the supply of copper scrap is inelastic in the short run, the long-run supply is more elastic, as is the long-run demand for scrap. According to Gellman, these shifts are caused by (1) the capability of scrap to be sorted, processed, and reclaimed into a secondary metal which is substitutable for the primary metal; and (2) increases in international copper prices in times of copper shortages which makes it more attractive for smelter/refiners and primary producers to increase their consumption of obsolete scrap.

These factors support the conclusion that brass, bronze, copper or alloy and matte scrap, are competitive with the virgin material copper concentrate. We do not find, however, that it is competitive with copper ore since this material is not a direct input in the processing stage but must be concentrated before it can be used.

356 I.C.C.

Copper ore and concentrates do not originate in the eastern and southern territories in any large amount. Therefore, any comparison of ratios between copper concentrates and scrap must be based only on copper concentrate movements originating in the West.

In the West, there is a wide disparity in the ratios of copper ore (150), copper matte (237) and brass, bronze or copper alloy scrap (215). We must, therefore, determine whether the difference in ratios is justified by differences in transportation conditions. As stated earlier in our "Analysis" section, the cost transportation characteristics such as loading, weight, mileage, type of car, special handling, et cetera, have been taken into consideration. An important noncost transportation characteristic, however, which distinguishes these virgin and recyclable commodities, is the value of service.

Copper concentrates have a metallic value of approximately 25 percent copper. Although we do not have information as to the value of a copper concentrate (copper ore with a metallic content of 0.65 of 1 percent copper costs between \$5 and \$6 a ton), the lower metallic content of the concentrate compared with brass or bronze scrap (80 to 95 percent copper) which can sell for over \$1,000 per ton illustrates that scrap can bear a higher share of the transportation burden. The movement of copper concentrates and the costs thereof have caused smelters generally to be located close to concentrating facilities and copper markets. This illustrates that the lower valued commodity cannot afford as high a transportation burden and still move. We also note that copper ore and concentrates are subject to diversion to private carriage which would also justify a lower ratio for the virgin commodity.

There is also no evidence of record to indicate that the disparity in ratios of brass, bronze, and copper alloy scrap has operated to the advantage of copper concentrate and to the disadvantage of the scrap. Overall, the recycling rate of copper has remained relatively stable in comparison to the consumption of total copper as stated later in our discussion of copper matte.

Little data has been presented as to copper matte, which has a metallic content of generally 40 to 45 percent. Copper residues and slag have a metallic content of 25 percent. No information was presented as to the price of this commodity (although respondents indicated its high value required special security measures), the ratio of rate to price or the amount of this traffic moving over a period of time in the East or South. As noted, there is evidence presented by the western carriers that special security measures are

356 I.C.C.

needed to protect this commodity. However, this was not quantified and the degree to which the rate-cost ratio is overstated cannot be measured.

Before we could require that the ratios on copper matte and scrap should be on a parity with those of copper concentrate, we would have to find that the difference in ratios has operated to the prejudice of the movement of copper matte or scrap to the advantage of the movement of copper concentrate.

Although NARI argues that general increases have distorted the rate structure between the recyclable commodities and copper ore or concentrate, that there is no evidence to indicate that this disparity has hindered the movement of scrap to the benefit of the virgin commodity. It is well established that a mere disparity in rates, in and of itself, is not proof of an injury or prejudice to a commodity.

In the West, five carriers provided information on the amount of copper ore, brass, bronze and alloy scrap, and copper matte originating in the western territory. Information as to the originations of copper ore was also presented for the entire southern district. The tonnage has fluctuated up and down for both the virgin and recyclable commodities. There is no indication that the amount of copper concentrate or ore is increasing with a corresponding decrease in the amount of recyclable commodities being transported. We also note that the total consumption of scrap copper has fluctuated up and down, as has the total consumption of refined copper, without any correlation to general freight rate increases. The percentage of scrap consumption to that of refined copper has also remained relatively fixed over the years averaging 44.7 percent and showing an increase to 51 percent in 1975. This evidence indicates that overall, there has been no impediment to the movement or consumption of copper scrap which has resulted in a corresponding benefit to the movement or consumption of copper ore or concentrates.

Except for the data presented by the five western roads on the amount of copper matte being transported, we do not know whether freight rates are having a more significant impact on the movement of this commodity than on the total movement of copper scrap. Although copper matte has a higher revenue cost ratio than scrap in the West and almost as high as that of scrap in the East, there is no indication that these high ratios have resulted in a benefit to the movement of copper concentrate. We, therefore, conclude that

356 I.C.C.

although copper scrap and matte are competitive with copper concentrate the evidence indicates that the rate structures for these commodities do not benefit one to the detriment of the other and that the rate structures are not unjustly discriminatory. Next we will consider reasonableness.

In the East, the ratio of revenue to variable cost for brass, bronze, and copper alloy scrap is 191. Considering the (1) value of the commodities, (2) the low constant ratio of freight rate to price, (3) the relatively stable proportion of scrap consumption to total copper consumption, and (4) the financial needs of the eastern carriers, which require a greater revenue contribution to improve their financial status, we conclude that the rate structures on these commodities in the East does not exceed the maximum level of reasonableness. Copper scrap has a ratio of 206 in the South and 215 in the West. The southern carriers did not present evidence as to the tonnage moving over a period of time, although we note that the tonnage for all nonferrous scrap has been increasing. Five western carriers provided data as to the movement of copper scrap which indicates that the amount originated fluctuated from year to year, with no discernible trend downward. Therefore, there does not appear to be any correlation between general rate increases and the movement of the traffic. Considering all the evidence of record, including the low ratio of rate to price for this commodity, and the fact that rate increases were only 1.4 percent of the price increases during this period, we conclude that the rate structure on this commodity is just and reasonable.

Copper matte has a ratio of 189 in the East. Again, no data has been provided as to the value of the commodity or the amount of tonnage moving annually over a period of years, therefore it is difficult to determine if the commodity can bear this ratio and still move. However, considering the financial needs of the eastern carriers, and the fact that additional costs may be incurred in protecting this commodity from theft, we conclude that this ratio is not above the maximum level of reasonableness in the East.

However, the ratio on copper matte in the West is higher than appears justified. If it has a value lower or equal to that of copper scrap it appears that it should have a comparable rate-cost ratio.⁷⁵ (It would also appear that if its value were similar, the same security measures necessary to protect the copper matte from theft would be

⁷⁵Copper scrap has a higher metallic content than matte (40 to 45 percent) and dross and skimmings (15 percent), so its value is probably higher also.

necessary for the scrap.) In the West, copper matte has a ratio of 237 compared to 215 for brass and bronze scrap. The ratio for copper matte in the West is also 25 percent higher than the ratio for the same commodity in the East.

The southern carriers presented no repetitive movements of copper matte, did not give total tonnages handled over a period of years, and where there was tonnage reported for 1975, it was a relatively insignificant amount. Obviously what traffic is available is not moving under the existing rail rate structure. The southern carriers have not explained this lack of movement or offered any justification or explanation of the existing rate structure. Without additional information and the cost-ratio, however, we are unable to determine if the rate structure on copper matte in the South is just and reasonable. Therefore, we will order a further investigation of this commodity in this territory as described in our "General Discussion and Conclusion." We will next discuss the effect of the rate structure on copper matte in the West.

High ratios in and of themselves are not sufficient to support a finding that a rate structure is unjust and unreasonable. It must also be shown that the rate structure has adversely affected the movement of traffic. Although respondents contend that rates have no effect on the movement of traffic, this conclusion is not well founded. Their conclusion is based on an aggregation of the total industry demand. Figures presented on the ratio of price to rate and consumption data is based on either one or two types of scrap (price ratio) or the industry as a whole (all scrap consumption). We cannot determine whether the consumption of copper matte has decreased or increased, its relationship of rate to price and whether this has increased or decreased over the years. The tonnage of copper matte originated by five western roads has fluctuated up and down, however, the tonnages for some of the carriers is lower in recent years.

The copper market is a competitive market among consumers of secondary scrap and between consumers of secondary scrap and primary producers. Upward fluctuations in price of refined copper cause primary producers to increase their consumption of scrap because it becomes more economically feasible to use the material. In such circumstances the level of rail freight rates would become more significant. We also must measure the effect of rate increases on shippers of scrap. In the case of some commodities, the refined primary metal sets the price level for scrap so that at certain price relationship levels, the scrap will no longer be economical to

356 I.C.C.

consume. This can force the seller of scrap to either absorb the increased freight rate, lose its share of the market, or shift to another form of transportation. Although this may not cause less tonnage to be moved by all modes, it can decrease the profits of the shipper and thereby cause it to be injured or cause it to shift to another mode. As stated in the FEIS, although the impact of freight rates may not be significant in the short run, the long run effect is greater. We, therefore, find that freight rates on copper matte in the West affect the movements of that commodity. Upon consideration of all the evidence of record, we, therefore, conclude, that the ratios on copper matte in the West should be reduced by 10 percent. This reduction will not have an adverse impact on the western roads.⁷⁶

As stated the section entitled Evidence Presented, the railroad tariff definition of recyclable material will be modified as to conform to the definition given in section 204.

LEAD ZINC OR ALLOY SCRAP, AND LEAD AND ZINC RESIDUES ZINC AND LEAD ORES

(STCC NOS. 40 213, 33 322, 332, and 10 3)

General.—Zinc⁷⁷ is a bluish-white metal which is chemically active. It is used extensively to protect iron and steel products against corrosion. Zinc produced from newly mined ores is termed primary or virgin zinc. When it is produced from scrap or it is called secondary, redistilled, or remelt zinc depending upon the process utilized for recovery. Secondary zinc, like the other nonferrous metals consists of home, prompt, and obsolete scrap.

Supply of zinc scrap.—Zinc is recovered from obsolete scrap (diecasting, engraver's plate, brass and bronze). In 1970 it represented less than 5 percent of the total zinc supply. New scrap, principally zinc-base and copper-base alloys from manufacturers and drosses from molten galvanizing and diecasting pots, contributed 15 percent in 1970. A large amount of zinc is lost in galvanizing and compounds.

The area of major potential recovery is in the recycling of diecastings from discarded automobiles and appliances. During the

⁷⁶Based on the 1975 Waybill Sample, the revenue for copper matte originating in the West is \$5,056. Multiplied by the weighing factor of 133 from the 1974 Freight Commodity Statistics (1975 statistics are not available), the total revenue is \$672,488. A 10-percent reduction will result in the loss of \$67,244.

⁷⁷The discussion of the production and markets of zinc and lead, are based on data from the *Minerals Yearbook, 1973, supra, Mineral Facts and Problems, 1970 and 1974, supra*, and the submission of the parties.

356 I.C.C.

1960's zinc recovered from old zinc-base scrap amounted to 8 percent of the zinc consumed in zinc-base alloys, and zinc recovered from copper-base scrap amounted to 25 percent of zinc consumed in copper-base alloys. It is estimated that the pool of recoverable zinc-in-use accumulated from 1939 to 1960 amounts to 4.5 million tons of which could be reclaimed under efficient collection, technology, and price factors.

Zinc recovered in 1973 from zinc-bearing scraps was 387,539 tons, nearly the same as in 1972. Semimanufactured forms of zinc- and copper-base alloys accounted for 98 percent of the old and new scrap. In 1974, the production of zinc from old scrap was 75,000 short tons or 4.8 percent of total demand. In 1973, zinc was recovered in alloys, 53 percent principally brass and bronze; in metal, 32 percent; and in chemical products, 15 percent.

The amount of slab zinc produced recovered from scrap in 1973 was 87,466 short tons compared to 80,923 short tons in 1971, and 73,718 short tons in 1972. The total amount of U.S. secondary zinc produced was 300,073 short tons in 1973, compared to 279,399 and 314,043 short tons in 1971 and 1972 respectively.

Production of zinc scrap.—The processing of zinc scrap can be done in a variety of ways. Some scrap is vaporized in a furnace and then converted to zinc oxide in a suitable combustion chamber. Other scrap is processed in a retort and condensed to either dust or slab zinc depending on the type of condenser used. Much of the scrap treated to produce slab zinc is part of the feed to primary zinc smelters of the pyrometallurgical type. Approximately half of the secondary zinc recovered is from copper base alloys, principally brass.

Zinc base alloys are recovered by remelting and redistillation to commercial zinc products and copper base alloys are remelted and the zinc reused in brass and bronze ingot.

Slag-fuming plants also process hot and cold lead, blast furnace slags, and residues which contain from 11 percent to 23 percent recoverable zinc to produce zinc oxide fume. This oxide is either sent to zinc smelters, or electrolytic refineries for recovery of zinc, or sold to consumers as zinc oxide. The production of zinc oxide in 1973 was 252,500 tons of which 15 percent came from secondary materials, 53 percent from ore and concentrate, and 32 percent from slab zinc.

The following table shows the amount of primary and redistilled secondary slab zinc produced from 1969 to 1973.

TABLE 60

Primary and redistilled secondary slab zinc produced in the United States¹

(SHORT TONS)

	1969	1970	1971	1972	1973
Primary:					
From domestic ores	458,754	403,953	403,760	400,969	365,307
From foreign ores	581,843	473,858	362,683	232,211	176,012
Total	1,040,597	877,811	766,433	633,180	541,319
Redistilled secondary	70,553	77,156	80,923	73,718	87,466
Total (excludes zinc recovered by remelting)	1,111,150	954,967	847,356	706,898	628,785

¹Excludes processed GSA stockpile zinc.

Source: *Minerals Yearbook, 1973, supra, p. 1331.*

Zinc sulfate production is approximately 56 percent from secondary material and 44 percent from ore or intermediate products. This type of zinc (43,900 tons consumed in 1973) is sold to the rubber industry, photocopying, paints, and agriculture industries.

The following table shows the amount of distilled and electrolytic zinc produced from 1969 to 1973. As can be noted, in 1973, primary smelters redistilled 64,485 short tons of secondary zinc and secondary smelters redistilled 22,981.

TABLE 61

Distilled and electrolytic zinc, primary and secondary, produced in the United States, by method of reduction

(SHORT TONS)

Method of reduction	1969	1970	1971	1972	1973
Electrolytic primary	453,539	393,280	321,517	259,816	210,468
Distilled	587,058	484,531	444,916	373,364	330,851
Redistilled secondary:					
At primary smelters	60,607	65,776	68,612	63,034	64,485
At secondary smelters	9,946	11,380	12,311	10,684	22,981
Total	1,111,150	954,967	847,356	706,898	628,785

Source: *Minerals Yearbook, 1973, supra, p. 1331.*

194d

Zinc scrap can be used to produce zinc slab, dust remelt zinc, die castings, alloys, and other products. The following table shows the amount and kind of zinc products derived from zinc from 1969 to 1973.

TABLE 62

Production of zinc products from zinc-base scrap in the United States

(SHORT TONS)

Products	1969	1970	1971	1972	1973
Redistilled slab zinc ---	70,553	77,156	80,923	73,718	87,466
Zinc dust -----	33,747	29,605	29,095	40,569	36,531
Remelt zinc -----	3,978	3,494	1,590	5,850	1,096
Remelt die-cast slab ---	16,979	16,686	18,339	13,555	12,595
Zinc-die diecasting alloys -----	4,401	4,361	3,316	3,927	4,786
Galvanizing stocks -----	1,849	762	633	572	670
Secondary zinc in chemical products -----	45,298	42,238	45,312	50,047	56,591

¹Revised

Source: *Minerals Yearbook, 1973, supra, p. 1332.*

Primary production.—Zinc is found either in zinc ore, as a lead-zinc ore or in lead-zinc-silver ore deposits. Mines in the United States produced 478,850 tons of recoverable zinc in 1973, 532 tons more than 1972. Missouri, New York, Tennessee, Colorado, Idaho, and New Jersey, are the major zinc producing States in that order.

The zinc is separated from unwanted impurities by various mechanical processes⁷⁸ known as milling.⁷⁹ The ore can be crushed and ground and separated to form zinc concentrates. It is then ready to be reduced in an electrolytic deposition from a solution or by distillation in retorts or furnaces. In either method, the zinc concentrate is roasted to eliminate sulfur and for conversion to impure zinc oxide called roasted concentrates or calcines.

It is purified into zinc known as "Special High Grade or High Grade," which is collected and melted in a furnace and cast into slabs. The residues in the tank contain other lead, gold, and silver elements, and are generally shipped to a lead smelter where the metals are recovered in lead bullion.

Distillation retort plants are classified at batch horizontal retorts, continuous vertical retorts externally heated by fuel, and continuous

⁷⁸The discussion of production process is taken from *Mineral Facts and Problems, 1970, supra, page 808-811.*

195d

vertical retorts heated electrothermally. Zinc produced by distillation, normally a lower commercial grade, may be upgraded by refining to reduce the amount of impurities. Refining by redistillation produces zinc of 99.995 plus purity.

Blast furnaces are also used to produce zinc. An important advantage of this process is the ability to treat a lead-zinc concentrate and recover both metals, including any gold or silver.

The United States is heavily dependent on imports of zinc. In 1974 it consumed one-fifth of the total world supply, but produced only 8 percent of the primary zinc supply. Over the past decade, imports have provided 46 percent of total United States supply. The following chart shows the consumption of zinc for 1973.

TABLE 63

Consumption of zinc in the United States

(SHORT TONS)

	1969	1970	1971	1972	1973
Slab zinc -----	1,385,380	1,186,951	1,254,059	1,418,349	1,503,938
Dross (recoverable zinc contents) ¹	126,712	124,781	119,254	118,305	129,651
Secondary (recoverable zinc content) ²	302,075	259,864	277,381	307,369	298,336
Total -----	1,814,167	1,571,596	1,650,694	1,844,023	1,931,925

¹Includes ore used directly in galvanizing.

²Excludes redistilled slab and remelt zinc.

³Revised.

Source: *Minerals Yearbook, 1973, supra, p. 1,333.*

The major consumers of slab zinc⁷⁹ in the United States in 1973 were the zinc-base alloy industry, the galvanizing industry, brass and bronze. These industries and the products they manufacture are shown below.

⁷⁹Slab zinc accounted for 1,503,938 out of 1,931,925 tons of all zinc produced in 1973. 356 I.C.C.

TABLE 64

Slab zinc consumption in the United States in 1973
by grade and industry use

(Short tons)

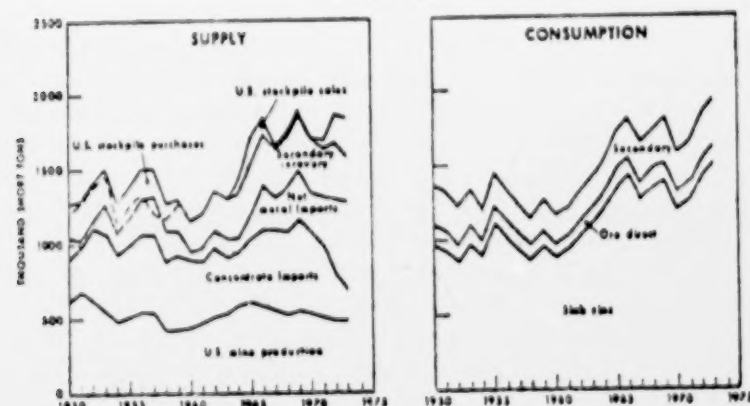
Industry	Special high grade	High grade	Inter- mediate	Brass special	Prime ¹ western	Remelt	Total
Galvanizing.....	40,242	31,745	16,235	125,083	350,054	478	563,837
Brass and bronze.....	43,745	113,421	86	6,795	33,568	35	197,650
Zinc-base alloy.....	595,867	13,739	14	269	388	329	610,606
Rolled zinc.....	16,553	479	20,462	.....	3,269	.....	40,763
Zinc oxide.....	25,930	2,876	195	.....	32,733	.....	61,734
Other.....	17,110	5,206	392	1	6,547	92	29,348
Total.....	739,447	167,466	37,384	132,118	426,559	934	1,503,938

¹Includes select grade.Source: *Minerals Yearbook, 1973, supra, p. 1334.*

Trends.—Research is being conducted to develop a workable means of separating and recovering zinc and lead from flue dusts, slags, and other metallurgical processing wastes.

The following charts show the trends for supply and consumption of zinc.

TABLE 65



Trends in supply and consumption in the United States.

Source: *Minerals Yearbook, 1973, supra, p. 1308.*
356 I.C.C.

Prices.—The price of prime western zinc has risen from 14.65 cents per pound (East St. Louis price) in 1969 to 20.66 cents per pound (delivered price) in 1973. The domestic price of zinc in the last 20 years has ranged from a low of 10.7 cents per pound in 1954 to a high of 20.66 cents per pound (delivered) in 1973.

Domestic prices are influenced by supply-demand balance, producer stock position, and by foreign prices. In primary production of zinc, the grade of ore, and byproduct metal content influence the cost per pound of the zinc recovered. Direct mining costs may range from \$2 to \$8 per ton depending on a variety of factors. Labor costs are estimated to comprise more than 50 percent of the direct mining costs. The following table shows the comparisons of relative prices for old scrap zinc to total demand for zinc.

TABLE 66

Comparison of relative prices for old scrap
zinc to total demand for zinc

Year	Ratio of prices for old zinc scrap to prime western zinc	Zinc production from old zinc (thousands of short tons)	Ratio of old zinc production to total zinc demand
1968.....	0.251	80	0.053
1969.....	0.214	82	0.052
1970.....	0.202	72	0.052
1971.....	0.211	80	0.061
1972.....	0.233	79	0.052
1973.....	0.360	89	0.053
1974.....	0.391	75	0.048

Source: FEIS, Ex Parte No. 319, p. 4-106.

Primary production.—Lead is derived from ores widely varying in metal content. Sources of lead range from the virtually zinc free lead ores of the Missouri lead belt through the complex lead zinc ores of the Western States to the nearly lead-free zinc ores of the Eastern States. Missouri produced 60 percent of the domestically mined lead, Idaho—14 percent, Utah—13 percent, and Colorado—6 percent. The ores are primarily mined by subsurface methods, and the ore is beneficiated at the mine site. Exceptions to this are custom mills which are centrally located to serve several mines. Concentrates are shipped to smelters and refineries for recovery of by products metal and for production of commercial grades of 356 I.C.C.

198d

refined lead. It is estimated by the Bureau of Mines⁸⁰ that transportation can represent up to 10 percent of the metal value of the concentrate and be a significant factor in the cost of production.

Lead is recovered almost exclusively by smelting in blast furnaces or open hearths employing carbon fuels. Ores or concentrates containing few impurities may be reduced to metal in roasting hearths. Air oxidizes the sulfides and coke or coal reduces the oxides.

At lead blast furnaces,⁸¹ the concentrates which generally contain 70 percent lead, are roasted-sintered to recover lead with a purity of between 97 and 99 percent. The lead can be subject to further refining processes to remove further metallic impurities. Refined lead which consists of seven grades, requires a minimum purity of 99.85 percent lead. Lead recovered from lead scrap processed at primary plants dropped to about 1,100 tons in 1973 compared to 7,000 tons in 1972.

Both domestic mine and smelter production of lead were down slightly in 1973 from the 43-year record high levels of 1972, to 603,000 tons. In 1973, refined lead produced at primary refineries amounted to 674,516 short tons, the extra lead coming from foreign ores, and government and industry stockpiles.

Primary producers as stated earlier, consume a very small portion of scrap as an input. Two percent of total lead scrap recovered was consumed by primary producers. The major use of this scrap was in the production of antimonial lead, which used 42 percent as an input in 1973. The percentage input of lead scrap consumed in the production of antimonial lead by primary consumers and their consumption of lead ore fluctuates up and down, for example in 1971, 13 percent of the lead input was from lead scrap, the rest coming from lead ore. However, the percentage of lead scrap recovered as antimonial lead by primary plants as compared to total production of antimonial lead from scrap was less than 1 percent in 1973. The recovery of metal from lead scrap by a primary producer compared to the total recovery of metal from lead scrap also is low, averaging 2 percent.

Secondary lead.—Scrap material consumed in 1974 totaled 601,000 tons, in 1973, 867,800 tons, and in 1972, 814,400 tons. The high resistance of lead and its alloys to corrosion permits a high degree of reclamation of lead. Obsolete cable covering, piping, type metal, sheet, and sheet lead are collected, remelted, and refined for

⁸⁰Mineral Facts and Problems, 1970, *supra*, p. 817.

⁸¹A new furnace developed in the 1960's for smelting lead-zinc concentrates, can use both oxidized ores and secondary materials as well as various mixes of lead and zinc concentrates.

199d

further use. Storage batteries are the major source of secondary lead amounting to 73 percent of the old scrap consumed. New scrap (drosses and residues) accounted for 154,700 tons or 18 percent of the total input. Approximately 140 secondary plants were engaged in recovery of lead and lead alloys from scrap material during 1973.

Secondary materials form a small portion of the feed at primary plants, for about 95 percent of the total is processed at secondary plants. There are similarities in processing secondary and primary lead at the refining stage. Scrap can be heated and refined in a process that is similar to the refining of virgin materials to remove unwanted impurities. It is technologically possible to refine scrap to an equal purity, however it is not generally done. Only soft lead is processed to meet the specifications of primary lead.

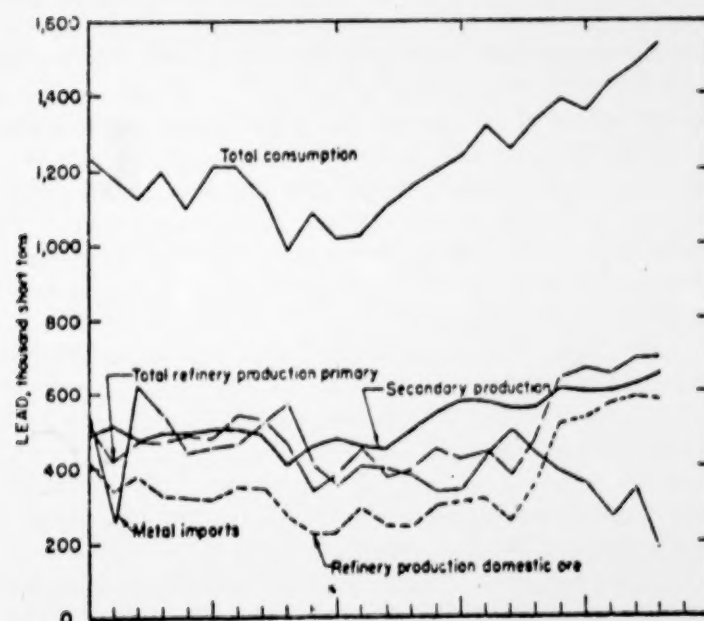
Secondary lead was recovered primarily as antimonial lead (53 percent); as soft lead (34 percent); and other lead and copper base alloys (13 percent), in 1974. Certain uses of lead such as gasoline additives and pigments are the major categories in which lead is permanently lost, and galvanizing, foil, solder, and collapsible tubes are largely unreclaimable. It is estimated that 50 percent of the lead used each year is a future lead resource.

In 1973, secondary smelter output increased 6 percent to 654,300 tons, a new record that amounted to nearly 49 percent of total smelter and refinery production of lead. Secondary output represented about 42 percent of total lead consumption in 1973. Over the 10-year period 1965-1974, secondary lead from old scrap accounted for 37 percent of the total amount of lead consumed in the United States.

The following table shows the production of primary and secondary lead:

356 I.C.C.

TABLE 67



Source: *Minerals Yearbook*, 1973, *supra*, p. 707.

The following table shows the type of lead recovered by kind of scrap and form of recovery:

TABLE 68

Kind of scrap	1972	1973	Form of recovery	1972	1973
New scrap:			As soft lead:		
Lead-base.....	113,795	110,787	At primary plants..	1,189	.....
Copper-base.....	4,669	4,506	At other plants.....	172,168	186,124
Tin-base.....	421	403	Total.....	173,357	186,124
Total.....	118,885	115,696	In antimonial lead ¹ ...	345,882	375,778
Old scrap:			In other lead alloys..	82,725	75,545
Battery-lead plates....	347,881	369,819	In copper-base alloys..	14,614	16,805
All other lead-base....	134,209	153,938	In tin-base alloys.....	19	34
Copper-base.....	15,620	14,831	Total.....	443,240	468,162
Tin-base.....	2	2	Grand total.....	616,597	654,286
Total.....	497,712	538,590			
Grand total.....	616,597	654,286			

¹Includes 5,816 tons of lead recovered in antimonial lead from secondary sources at primary plants in 1972 and 1,065 in 1973.

Source: *Minerals Yearbook*, 1973, *supra*, p. 707.

Consumption.—In 1973, 1.54 million tons of lead was consumed. The major use of lead is in transportation of which the largest requirement is for storage batteries which account for 50 percent of lead use. There is some indication, however, that the advent of the maintenance free battery will decrease the demand for lead in this area. The second largest use is as a gasoline additive. Again, there is an indication that the amount of lead used in this area will also decline with the increased use of lead-free gasoline. Lead is also used in construction in pipe and foils, although increased competition from plastics and aluminum have decreased its relative share of the market. Lead covered cable is used in the communications industry, lead shells for ammunition, lead packaging, lead handset printers, pigment, solder, and other miscellaneous products are also manufactured from lead.

PART IA

MOVEMENTS OF RECYCLABLE AND VIRGIN MATERIALS

Respondents and supporting shippers.—Between points in official territory there are incentive-loading rates on zinc dross, residues or skimmings, minimum 100,000 pounds. This basis is employed on heavy volume, repetitive movements between major points of origin and destination. Where revenues are inadequate a minimum of 120,000 pounds has been established. In addition, point-to-point commodity rates based on capacity loading, have been published to meet truck competition.

Within SFA territory rates on zinc dross are based on minimum weights of 40,000, 60,000, and 80,000 pounds.

There are some point-to-point rates. Two examples are from Alabama City, Ala. or Pryor, Tenn., to Josephtown, Pa., with 100,000-pound rates of 93 cents and 96 cents per hundred pound, respectively. The zinc dross moves in box cars, either loose or in drums with weights varying between 20 and 57 tons per car.

In docket No. 28300, class 27 1/2 percent was prescribed on zinc residues, scrap lead, and lead residues. MP points out that the rates in its repetitive movements of these commodities range from a low of 5.2 percent to a high of 15.8 percent, which is considerably lower than the class 27 1/2-percent basis.

In *Nonferrous Metals*, 204 I.C.C. 319 (1934), the Commission found the rates on ores and concentrates of nonferrous metals and on copper, lead, and zinc to be reasonable. Since that time, no 356 I.C.C.

proceeding has established rates for general application on shipments of lead and zinc ores or concentrates.

Since lead and zinc ores are produced in only a few States, a scale of rates which would have general application has not been felt necessary.

In official territory, ConRail (Penn Central) originated little if any lead or zinc ore. However, there were several movements of zinc concentrates. One of 200,000 pounds was from Emeryville, N.Y., to Josephstown, Pa., in shipper-owned equipment.

In the West, lead and zinc ores are rated at class 20, minimum 60,000 pounds. Lead and zinc concentrates are rated at class 27 1/2, minimum 50,000 pounds. However, rates are generally published at a much lower level. From the southwestern lead producing area, point-to-point rates on concentrates range from a low of 6 percent to a high of 15.4 percent of class 100. There is no published scale of rates applicable on ores or concentrates in the West because of the small number of origination and destination points.

Rates on shipments originating in the Midwest, Eastern, and Southern parts of the United States destined to western points and rates from the Southwest to major portions of the United States and Canada are all published as specific point-to-point rates. Rates from Western States and points in Canada to points in the United States and parts of Canada are also published as specific point-to-point rates. In addition a few carriers publish their own specific point-to-point rates.

Opposing shippers.—Reynolds in analyzing the carriers' cost data prepared by witness Hird found many aberrations in the ratemaking process. One of the examples it noted was that on lead waste in SFA territory which produced 141.1 percent revenues above variable cost and 83.1 percent above fully allocated cost. It argues that the respondents have not established the reasonableness of this rate.

Respondents' revenue variable-cost ratios.—The table below was developed from data introduced by the TEA, the SFA, and the WRA. The number of movements shown includes both inter- and intrastate traffic.

356 I.C.C.

TABLE 68

Average ratio of revenue-to-variable cost¹

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 3 - Lead or zinc ores	246	6	159	8	167	31
<i>Recyclable commodities</i>						
33 322 - Lead matte	194	1	0	0	216	14
33 332 - Zinc dross, residues.....	196	7	249	1	211	15
40 213 - Lead, zinc, alloy scrap....	191	18	241	1	193	33

¹Averages reflect weighted average ratio of revenue-to-variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harity of Western Railroad Association.

Comparison of respondent's revenue-variable cost ratios

1. *Lead matte (33 322) vs. lead or zinc ores (10 3).*—This comparison shows that in the East the average ratio for the virgin commodity, lead, or zinc ores, is higher than the ratio for the recyclable commodity, lead matte. The opposite is true in the West where the average ratio for lead matte (216 percent) is higher than the ratio for lead or zinc ores (167 percent). There are no movements of lead matte in the South. The comparison in the West is based on a total of 45 movements, 31 of lead or zinc ores and 14 of lead matte, while the comparison in the East is based on only 7 movements.

2. *Zinc dross (33 332) vs. lead or zinc ores (10 3).*—In the East, this comparison is the same as in comparison (1). The average ratio of 246 percent for lead or zinc ores is substantially higher than the ratio of 196 percent for zinc dross. However, as noted in comparison (1) this comparison is based on a very small number of movements; 7 for zinc dross and 6 for lead or zinc ores.

The average ratio for zinc dross in the South (249 percent), is much higher than that for lead or zinc ores (159 percent), but the average ratio for zinc dross is based on only 1 movement.

The average ratio for zinc dross in the West is substantially higher than the ratio for lead or zinc ores (211 vs. 167 percent).

3. *Lead, zinc, or alloy scrap (40 213) vs. lead or zinc ore (10 3).*—This comparison is the same as the comparison in (2). The

356 I.C.C.

average ratio is higher for the virgin commodity in the East and higher for the recyclable commodity in the South and West. As in the comparison shown in (2), the ratio for the recyclable commodity in the South is based on only 1 movement.

Opposing shipper comments.—NARI groups the results of the respondent railroads and redispays these results for each territory, weighting such results according to the carloads of each commodity taken from the 1974 DOT 1-percent waybill sample. NARI criticizes the railroads for merely presenting their results on a commodity basis, for not displaying weighted results for groups of virgin and recyclable commodities and comparing these results for recyclable commodities with their competing or potentially competitive virgin counterparts.

Without changing or adjusting the ratios of revenue-to-variable cost shown by the railroads, NARI weights those results by their mix in the 1-percent waybill sample. Those results are shown below:

Ratio of revenue to variable cost for lead and zinc (percent)

Territory	Virgin	Recyclables
East.....	247.5	191.0
South.....	158.7	241.1
West.....	176.5	207.5

NARI's results show that the ratio is higher for the virgin commodity only in the East, while the ratio is significantly higher for the recyclable commodity in the South and West.

Discussion and conclusion relative to shipper comments.—NARI attempts to redisplay the results of the respondent railroads, using the relative weights of each commodity from the 1974 DOT 1-percent waybill sample.

While agreeing that weighting of the cost data for two or more commodities for comparative purposes has merit, the method used by NARI is suspect. The data of record is not the result of a statistical sample. There is no basis for assuming that the same consist of traffic movements exists in the data of record as in the 1-percent waybill sample. In the absence of more complete data weighting cannot be performed properly.

356 I.C.C.

Commission's adjustment of respondent's revenue-variable-cost ratios.—The following chart portrays our adjustment to the respondent's movements after the elimination of paper movements, duplicate movement, and the grouping of movements by originating territory.

TABLE 68B

Average ratio of revenue-to-variable cost (percent)¹

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 3 - Lead or zinc ores	244	7	154	8	162	23
<i>Recyclable commodities</i>						
33 322 - Lead matte	156	1	.....	0	171	12
33 332 - Zinc dross	179	12	214	2	151	13
40 213 - Lead, zinc, or alloy scrap --	186	20	226	2	155	25

¹Based on interstate movements only.

Comparison of Commission's revenue-variable-cost ratio

1. *Lead matte (33 322) vs. lead or zinc ores (10 3).*—This comparison shows a higher average ratio for the virgin commodity, lead or zinc ores, than for the recyclable commodity, lead matte, in the East. Since there are no movements of lead in the South, no comparison can be made for that territory.

The ratios in the West do not differ widely from each other. The average ratio for lead matte is higher (171 percent) than the ratio for lead or zinc ores (162 percent).

2. *Zinc dross (33 332) vs. lead or zinc ores (10 3).*—A comparison of the ratios for these two competing commodities shows different results for each territory. In the East, the average ratio of revenue to variable cost is substantially higher for the virgin commodity, lead or zinc ores (244 percent) than for the recyclable commodity, zinc dross (179 percent).

The opposite is true in the South where the average ratio for zinc dross is 214 percent, compared to only 154 percent for lead or zinc ores. It is worth noting that all eight movements of lead or zinc ores in the South are movements of zinc ore, with no movements of lead ore. The same comparison for the West shows that the average ratio

356 I.C.C.

for lead or zinc ores (162 percent) is higher than the ratio for zinc dross (151 percent) but that this difference in ratios is not extreme.

3. *Lead, zinc, or alloy scrap (40 213) vs. lead or zinc ore (10 3).*—This comparison yields the same results as shown in comparison (2). It shows a higher average ratio for the virgin commodity, lead or zinc ores, in the East, a higher ratio for the recyclable commodity, lead, zinc, or alloy scrap, in the South, and approximately equal average ratios in the West.

Comparison of Commission's results with respondents' results.—The major difference between the ratios of revenue to variable cost shown by respondents and the ratios shown by the Commission is for the three recyclable commodities in the East. These differences lead to different conclusions in each of the three comparisons made above.

Based on respondents' results, the average ratio for each of the three recyclable commodities in the West is substantially higher than the average ratio for the virgin commodity, as stated above. The Commission's adjusted results show the average ratio for two of the recyclable commodities, zinc dross (33 332) and lead, zinc, or alloy scrap (40 213), to be lower than the average ratio for the virgin commodity, lead or zinc ores (10 3). The average ratio for lead matte (33 322) is shown to be only slightly higher than the average ratio for lead or zinc ores in the West.

The difference can be explained by the fact that: (1) intrastate movements are not included in the Commission's adjusted results, and (2) respondent's average ratios for the West are simple average ratios while the Commission's results reflect weighted average ratios. An example of how these differences can occur are enumerated below:

1. For zinc dross, a movement within the State of Texas shows a ratio of revenue to variable cost of 370 percent. This ratio is reflected in the simple average shown for the West, but is not included in the Commission's ratios as intrastate movements are excluded from these results.

2. While the weighted average ratios of revenue to variable cost shown in the Commission's results show 171, 151, and 155 percent for the three recyclable commodities, the Commission's simple average ratios for those same commodities are 207, 210 percent, are very close to those shown for the respondents.

In summary, the following table best illustrates the comparison between revenue to variable cost ratios for virgin commodities and recyclable commodities.

TABLE 68C

Average ratios of revenue-to-variable cost (percent)

	East		South		West	
	Respond- ents	Com- mission	Respond- ents	Com- mission	Respond- ents	Com- mission
<i>Virgin</i>						
10 3 - Lead or zinc ores -----	246	244	159	154	167	162
<i>Recyclable</i>						
33 322 - Lead matte -----	194	156	-----	-----	216	171
<i>Virgin</i>						
10 3 - Lead or zinc ores -----	246	244	159	154	167	162
<i>Recyclable</i>						
33 332 - Zinc dross -----	196	179	249	214	211	151
<i>Virgin</i>						
10 3 - Lead or zinc ores -----	246	244	159	154	167	162
<i>Recyclable</i>						
40 213 - Lead, zinc or alloy scrap ---	191	186	241	226	193	155

PART 1B

TRANSPORTATION CHARACTERISTICS

Respondents and supporting shippers.—The information presented in WRR-2 forms submitted by the western roads show that lead and zinc residues, generally move in general service gondolas; flue dust can be carried in gondolas or covered hopper cars; zinc dross moves in general service gondolas; and lead scrap moves in boxcars or general service gondolas. In the West, rail movements made in gondola cars have an average weight of approximately 90 tons per car as compared to the 50 tons per car in the former boxcar movements.

There were generally no special handling or equipment maintenance problems. However, it was noted that in movements of 356 I.C.C.

scrap batteries, battery acid often leaked from the batteries, contaminating and damaging the interior of the boxcar.

The Southern states that zinc dross moves in boxcars, loose or in drums. The weight of the shipments vary between 20 and 57 tons per car. In 1975 it handled 19 carloads of zinc within SFA territory.

According to the WRA, movements of lead and zinc ores are made throughout the year and in heavy volume to and from relatively few points. They are handled in newer gondola cars which must be water tight and require frequent cleaning. The carloads have an average weight of 90 tons per car. There is relatively little loss or damage in transit. Transit privileges are accorded at relatively few points and reconsignment is rare. Shipments of concentrates are sometimes held at terminals increasing car days of these shipments.

The Southern indicates that zinc ore or concentrates move in hopper cars with an average weight of 95 tons per car.

Opposing shippers.—RSR on behalf of NARI, states that there is no difference between shipping recycled and primary lead. Both items can be loaded into the same type of boxcar, and neither is vulnerable to damage.

PART II

HISTORICAL EVIDENCE ON UTILIZATION OF RECYCLABLE MATERIALS

Respondents.—The Southern Railway submitted the following information on the consumption of lead and zinc scrap.

TABLE 69

Recycling trends since 1960—production from scrap: as percentage of Nation's metal consumption

Year	Lead	Zinc
	Percent	Percent
1975 (EST).....	50	23
1974.....	44	20
1973.....	42	22
1972.....	42	23
1971.....	42	26
1970.....	44	28
1969.....	43	29
1968.....	41	28
1967.....	44	28
1966.....	43	30

356 I.C.C.

Recycling trends since 1960—production from scrap: as percentage of Nation's metal consumption—Continued

Year	Lead	Zinc
	Percent	Percent
1965.....	46	30
1964.....	45	29
1963.....	42	29
1962.....	40	31
1961.....	44	36
1960.....	46	36

It states that the amount of lead or zinc ore originating in the Southern District dropped 38 percent from 1967 to 1974 (from 293,574 tons to 180,783 tons). Revenue per ton on this traffic increased 50 percent (from 438 cents per ton to 657 cents per ton) compared to 60 percent for all other traffic. This tonnage reduction is alleged to be caused by a decrease in mine production in Tennessee where according to the United States Bureau of Mines, production dropped 31 percent from 1970 to 1974. The following table shows the tonnage handled or originated by the carrier for the period 1970 through 1975.

356 I.C.C.

210d

TABLE 70

Lead and zinc scrap, lead matte, zinc residues, and lead and zinc ores (STCC Nos. 40 213, 33 332, 33 322, and 10 3)

TONNAGE CARRIED (1970-1975)

STCC	Carrier	1970	1971	1972	1973	1974	1975
West..... 33 322	MP.....	11,399	14,696	7,266	7,889	9,706	8,423
	UP.....	9,500	5,465	9,807	5,428	2,958	6,692
	SLSF.....	N/A	3,452	5,762	18,003	9,230	13,325
	MP.....	147,414	140,923	152,253	154,766	141,981	155,691
33 332	UP.....	9,042	49,910	32,043	38,883	30,502	20,951
	SLSF.....	N/A	18,561	20,656	18,884	22,625	12,935
	MP.....	118,296	59,984	94,468	41,226	48,676	50,910
	UP.....	35,773	43,154	25,059	36,354	33,655	21,168
40 213	SLSF.....	N/A	798,999	821,959	248,224	268,067	398,001
	MP.....	753,367	405,976	470,550	613,915	731,072	523,990
	SLSF.....	517,980	503,718	444,449	425,444	468,666	378,446
	UP.....	550,893	386,526	360,239	324,227	293,488	366,893
West..... 10 3	MP.....						
	UP.....						
	SLSF.....						
	UP.....						

N/A—not available

356 I.C.C.

211d

Opposing shippers.—NARI presented evidence showing the utilization and pricing data for slab zinc and scrap zinc for the period 1966 through 1975. The annual consumption of zinc scrap has fluctuated within a range of approximately 10,000 tons from 1966 to 1973 averaging 259,000 tons. However, in 1974 and 1975 it dropped to 224,000 tons and 145,000 tons respectively. The consumption of slab zinc averaged 1,330,000 tons from 1966 to 1974, with consumption dropping to 925,000 tons in 1975. From this data, NARI concludes that the utilization of scrap has remained stagnant or declined, while the utilization of virgin slab zinc has remained relatively constant, except for 1975.

NARI also provided the average prices for scrap zinc in cents per pound for the years 1969 through 1975 as follows:

TABLE 71

	Virgin slab zinc	Scrap zinc
1969.....	15.15	6.71
1970.....	15.82	6.49
1971.....	16.14	6.54
1972.....	17.73	7.25
1973.....	20.84	10.18
1974.....	35.94	17.78
1975.....	38.89	13.22

NARI presented statistics showing that the consumption of primary lead averaged approximately 882,000 tons from 1966 through 1972 although it fluctuated up and down during this time. In 1973, it reached a high of 1,159,000 tons but has decreased since then to 982,000 tons in 1974 and 683,000 tons in 1975. Lead scrap consumption has increased slowly over the years as shown below, averaging 605,000 tons.

TABLE 72

	U.S. consumption of lead scrap (in 1,000 tons)	Price in cents per pound of virgin primary lead	Average prices in cents per pound of scrap
1966.....	573	15.12	10.8
1967.....	554	14.00	8.31
1968.....	551	13.21	6.40

356 I.C.C.

TABLE 72—Continued

	U.S. consumption of lead scrap (in 1,000 tons)	Price in cents per pound of virgin primary lead	Average prices in cents per pound of scrap
1969	604	14.93	8.60
1970	597	15.69	7.13
1971	597	15.89	4.36
1972	617	15.34	5.65
1973	654	16.31	7.66
1974	699	23.19	11.66
1975	610	21.52	8.94

These figures, NARI states, show that lead scrap utilization has remained relatively stagnant but slightly increased. The prices of virgin primary lead exceed those of scrap. It argues that, therefore, there is no justification for charging low-valued scrap higher freight rates which prevent an increase in its recycling.

If the unreasonable and discriminatory freight rates are eliminated, NARI projects that the recycling volume of copper, lead, and zinc will increase between 30 and 40 percent by 1986.

NARI also compiled data comparing the rate structures for the movements of zinc scrap, dross, and residues and virgin ore and concentrates and the effect of general increases on the rates since 1959. This data, shown below, based on approximately the same mileage and within the same territory, illustrates how the increases have aggravated and disturbed a rate structure which NARI contends was discriminatory.

356 I.C.C.

TABLE 73

Rate disparity and impact of rate increases

Zinc scrap (STCC 402) and Zinc dross (STCC 33 332)				Zinc ore and concentrate (STCC 1032)				
Ex Parte No.	Increases per hundred-weight	Rate in cents per hundredweight		Increases per hundred-weight	Rate in cents per hundredweight			
		(¹)	(²)		(¹)	(²)		
223-----	Cent	1	41 1/2	Cent	1/2	32	102	48
255-----	Percent	3	43 1/2	Percent	2	34	105	50 1/2
259-B-----	5	46	156	80	5	36	110	53
262-----	6	48	164	85	6	38	117	56 1/2
265-B-----	6.5	51	174	90	6	40	124	60
267-B-----	11	57	193	100	12	46	138	67
281-B-----	3	59	199	103	4	48	143	70 1/2
295-B-----	3	60	205	106	3	49	150	72 1/2
299-B-----	2.8	62	211	109	2.8	51	154	74 1/2
303-B-----	4	65	219	113	4	53	160	77 1/2
305-A-----	3.3	67	226	117	3.3	55	165	80
305-RE-----	10	73 1/2	248	129	10	60	182	88
310-A-----	(¹)	(²)	(³)	(¹)	7	64	195	94
313-----	5	77	260	135	5	66	205	99
313-----	2.5	79	267	139	2.5	68	210	102
Western territory				Southern territory				
				No increase				

356 I.C.C.

The spread between recyclables and virgin commodities has widened from 9 1/2 to 11 cents in the East, 43 to 57 cents in the South, and from 20 to 37 cents in the West. This is due to the application of percentage increases to higher rates on scrap than on ores.

A comparison of the rate structure on lead scrap and lead ore or concentrate in the western territory illustrates, NARI contends, how a discriminatory rate base has been further aggravated and distorted by increases.

TABLE 74

Rate disparity and impact of rate increases

Ex Parte No.	Lead scrap (STCC 40213)		Lead concentrate (STCC 10312)	
	Increases per hundred-weight	Rate in cents per hundred-weight ⁽¹⁾	Increases per hundred-weight	Rate in cents per hundred-weight ⁽¹⁾
	Cent		Cent	
223	1	126	1/2	35
	Percent		Percent	
256	3	129	2	37
			Percent	
259-B	5	135	5	39
262	6	143	6	41 1/2
265-B	6	152	6	44 1/2
267-B	11	169	12	49
281-B	3	174	4	52
295-B	3	179	3	53
299-B	2.8	184	2.8	55
303-B	4	191	4	57
305-A	3.3	197	3.3	59
305-RE	10	217	10	65
310-A	(¹)	(¹)	7	70
313	5	228	5	73
313	2.5	234	2.5	75

⁽¹⁾No increase.⁽¹⁾Western territory.

NARI also contends that the carload revenue for the recyclables is greater than that for the virgin materials. In the South for example, the carload revenue for lead and zinc ores is \$931, compared to \$1,451 for scrap and \$1,433 for dross, and in the West, the carload revenue for the virgin material is \$922, compared to \$1,384 for scrap, \$1,361 for lead matte, and \$1,361 for zinc dross.

PART III

SENSITIVITY OF RECYCLABLE MATERIALS TO CHANGES IN TRANSPORTATION RATES

Respondent.—Gellman did not specifically analyze lead and zinc scrap. Instead their discussion of this commodity is included in a section concerned with nonferrous scrap. It is concluded by Gellman that the demand for nonferrous scrap metals is inelastic with respect to price because of the limited markets for these materials (derived demand), which reduces their price sensitivity. As the demand for the end products shift, the prices for scrap fluctuate.

Opposing shippers.—NARI contends that in the late 1960's 57.6 percent of total lead consumption was derived from recycled lead, if the amount of lead used as gasoline additives are subtracted. There is competition, it is alleged, with virgin supplies since primary and recycled lead can be used interchangeably for most applications.

RSR produces pure lead and alloys by smelting and refining lead-bearing scrap. Approximately 50 percent of all lead produced in the United States is produced by the recycling of lead-bearing scrap. It states that it is estimated that in 1976, lead consumption will be 1,400,000 tons, of which 71 percent or 990,000 tons will be available for recycling, 630,000 tons or 45 percent of which will be recycled. By 1980, it is forecast that 1,600,000 tons will be consumed, 75 percent of which (1,200,000 tons) will be available for recycling, and an estimated 900,000 tons or 56 percent will be recycled.

RSR contends that the following (and their percentage of total consumptions) can use recycled or primary lead interchangeably: industries' storage batteries (53 percent); chemicals (16 percent); paints and pigments (7 percent); ammunition (5 percent); and industrial solders (4 percent).

RSR indicates that several years ago, recycled lead normally sold at a discount of between \$10 to \$15 per ton to primary lead. Four or 5 years ago this changed and the prices are now relatively equal.

Producers compete with each other on the basis of price for sales of pure lead, regardless of the source of the new material with the basis of the price being the cost of the materials plus processing and transportation costs.

RSR contends that freight rates are thereby forcing recyclers into an ever increasing injurious position. The costs of accumulating scrap and shipping it to market will not allow the full utilization of recycling. Each \$1 per hundredweight freight rate equals \$2.13 per weight of finished metal (43 percent of batteries weight is recovered as metal). As the freight rates increase, the distance the raw material will move decreases and because recycled finished lead is produced in 40 or so various cities, there are no special freight rates to consuming points.

RSR estimates that the revenue per mile for recycled lead is \$1.24 (\$29.94 per ton x 75 tons = \$2,245.50 + 1,817 miles) and for primary lead is 89 cents per mile (\$29.94 per ton x 75 tons = \$2,245.50 + 2,517 miles). Primary lead is also alleged to have certain advantages afforded by milling in transit rates.

Although recycled zinc only accounts for 12 percent of the total zinc market, NARI argues that recycled zinc covers a range of types and purities of zinc and zinc alloys of which some are equivalent in characteristics and use to primary zinc.

PART IV

EFFECTS ON INDIVIDUAL RAILROADS

In the western territory, general increases have resulted in an increase in revenue to the Frisco. The revenue on lead ores or concentrates in 1975 was \$5.19 per net ton compared with \$2.63 per net ton in 1966. For zinc ores or concentrates in 1975, revenue was \$6.49 per ton compared with \$2.48 per net ton in 1966.

Lead and zinc ores and concentrates are 1.03 percent of the total revenue of the Frisco, 1.46 percent of its tonnage and 0.75 percent of its cars. It reported that it had 5,474 cars of lead and zinc ores or concentrates in 1975. This is compared to 7,914 cars in 1974.

The following table shows the percentage of lead and zinc residue or scrap handled or originated by a particular road in comparison to the total tonnage or revenue for all traffic. From this it is apparent that the commodities are a very small portion of the carriers' traffic and revenue.

TABLE 75
Lead and zinc scrap and residues (STCC Nos. 33 322, 33 332, and 40 213)
PERCENTAGE OF TONNAGE OR REVENUE OF INVOLVED COMMODITIES TO TOTAL CARRIER
TONNAGE OR REVENUE (1975)

	STCC	Carrier	Carloads	Tonnage carried	Revenue from commodity	Percent to total tonnage	Percent to total revenue
East	3332	PLE	.....	751		0.00921	
	40213	PLE	.....	40		0.00091	
South	33322	ICG	.....	2	\$2,714		
		LN	112	9,907	15,839		
		SCL	0				
	33332	Frisco	.....	41	944		
		LN	88	530	57,934		
		SCL	1				
		SOU	.....	2,033			
	40213	LN	355	15,664	130,130		
		SCL	338				
West	33322	SOU	.....	2,106			0.010
		MP	130	8,423	89,429		0.049
		SLSF	170	13,235	135,556		0.009
		UP	163	6,692	90,724		0.172
	33332	MP	1,726	155,691	1,493,858		0.041
		SLSF	205	12,935	11,346		0.037
		UP	377	20,951	359,727		0.052
	40213	MP	929	50,910	451,904		0.171
		SLSF	4,820	398,001	472,650		0.021
		UP	391	21,168	208,954		

The alternate rate structure proposed by NARI is discussed in the section on scrap aluminum. Little or no information was presented on the service to shippers.

PART VII

OTHER EVIDENCE

Environmental consideration.—The FEIS indicates that there are no technological requirements which require or limit the use of lead scrap in lead ore production. However, there is little or no use of scrap in the production of lead from virgin ore. There are similarities between secondary and primary production processes at the refining stage. Technically scrap can be purified to as high a level as primary refined lead, however, this is seldom done. Instead, secondary lead is generally used to take advantage of its alloy content.

Looking at the price of scrap and primary lead, scrap prices are lower. When the secondary and primary production is analyzed the relationship is stable, however, the price ratio has dropped. This data indicates that changes in relative prices have not affected the percentage of lead consumption from scrap.

The demand for scrap lead is derived from the demand for primary lead. This demand is based on the demand for lead by particular industries such as the automobile, gasoline, and munitions consumers. Overall, lead demand is not price sensitive.

Transportation may affect the demand for scrap in three ways: (1) substitution between scrap and virgin material, (2) substitution between lead and competing materials, and (3) lead's own price elasticity. Under parts (1) and (2) substitution would not be great unless price ratios or rates increased significantly. Lead's price elasticity and the impact of transportation thereon, would be as follows. Taking the average revenue per ton for rail movements of scrap lead at \$13.42 in 1974, a 10-percent increase in rail rates would equal an increase of \$1.34 per ton. This would increase the price of scrap lead by 0.58 percent from the 1974 average price of \$228.80. The 1 percent increase in price would result in a decrease of 0.322 percent in demand. A 10-percent increase in rail rates results in a 0.2-percent decrease in demand. Based on 1974 tonnage, this would be 1,397 tons. Therefore, it is concluded that freight rates have a negligible impact on the utilization of scrap lead.

356 I.C.C.

The FEIS concludes that the demand for zinc is inelastic and not responsive to the price of zinc. The statement looked at the demand elasticity for zinc diecastings (since most scrap zinc is recovered as diecastings). It computed the cost for shipping a ton of scrap zinc in 1974 as \$13.42. A 10-percent increase in rates would, therefore, represent a \$1.34 increase in the average rail rates. If this increase was directly passed on to the ultimate consumer, it would increase price 0.5 percent or to \$281.40 based on the 1974 average price. The elasticity of demand is estimated at -0.57. Therefore, the 10-percent increase in freight rates would decrease demand by 0.3 percent. This would have resulted in 225 fewer tons of scrap being demanded. From this, it is shown that transportation costs have negligible effect on the environmental profile of zinc.

DISCUSSION AND CONCLUSIONS

Technology limits the recycling and consumption of zinc by primary and secondary consumers. Scrap zinc accounts for only 5 percent of the total zinc supply. Secondary smelters do not consume zinc ore in their production processes, instead they remelt the scrap or process it in a retort furnace. Certain primary producers consume as part of their feed, scrap which has been treated for the production of slab zinc. However, this scrap is only a minor portion of the total scrap supply and a small portion of a primary producer's consumption, and it is unclear whether it displaces zinc concentrates or is complementary to it. Although NARI states that zinc scrap competes with zinc concentrates, it offers no evidence to support this contention or to rebut the respondents' evidence that zinc scrap and ore or concentrates do not compete.

Instead, NARI merely argues that the recycled zinc covers a range and purity of zinc and zinc alloys which are equivalent to the characteristics and uses of primary zinc. As the case with other nonferrous metals, an alloy made from scrap with the same specifications as one made from a primary metal is technologically substitutable, yet there are in fact, certain economic factors which limit this substitutability. As noted earlier, zinc base alloys are generally recovered as brass and bronze. This limits the markets in which the products compete. Zinc oxide, which is a relatively minor percentage of total zinc production can be made from both scrap zinc and ore or concentrate. Yet the amount of scrap used in the production of zinc oxide is only 15 percent. Overall, this is only 2 percent of total consumption. Zinc sulfate which also is produced

356 I.C.C.

from scrap and concentrate is only 2 percent of total zinc consumption. Redistilled secondary is only 14 percent of total primary and redistilled secondary slab zinc is 5 percent of total zinc consumption. These small percentages of the zinc market support the conclusion that the commodities do not compete.

No probative evidence has been furnished by NARI to support their allegation of end product competition. New technological changes in consumption patterns and shortages in zinc ore supply may at some future point create a competitive relationship between the commodities, however, at this time, based on known technology and data, we conclude that there is no competition.

Approximately 50 percent of all lead supplied in the United States is from lead-bearing scrap. RSR and NARI show that recycled or primary lead can be used interchangeably. Respondents contend that whether the end products compete is irrelevant to the determination of competition. Yet, little if any evidence as to inputs or end products was presented by respondents on the competitive relationship of lead scrap to lead ore or concentrate.

Lead scrap is a large component of the total supply of lead but primary producers presently consume a very minimal portion of lead scrap as a feed to their facilities. There is no requirement that lead be used by primary producers, however, there does not appear to be any constraints on its consumption. The refining stage for scrap and ore or concentrates is similar. In fact, a new blast furnace has been developed which allows for the introduction of scrap and concentrates at the smelting stage of production.

However, despite the technological substitution between lead ores or concentrates and lead scrap, the evidence does not conclusively establish that the recyclable and virgin materials compete as inputs of primary producers. Approximately 5 percent of the metallic input of a primary producer consists of lead scrap, however, only 2 percent of total lead scrap recovered is consumed by primary producers. The major use of this scrap is in the production of antimonial lead. However, the amount of lead scrap recovered as antimonial lead by primary producers as a percentage of total lead scrap recovered as antimonial lead is less than 1 percent. The recovery of metal from lead scrap by primary producers is also low, averaging 2 percent. These factors, in addition to the other evidence of record supports the conclusion that lead scrap does not compete with lead ore or concentrate but is complementary to it.

Even if a competitive relationship had been established for lead scrap and lead ore or concentrate and zinc scrap and zinc ore or concentrate, respectively, the evidence presented would not support the conclusion that the rate structures for the recyclable commodities has prejudiced its movement to the benefit of the virgin commodities. The freight rates and general increases on the recyclable commodities do not have any discernible impact on the movement of the recyclable commodities. Nor does the rate structure as affected by general increases, and the data on the traffic moving, show that the movement of the recyclables has decreased with a corresponding increase in the movement of the virgin commodities. Instead, the amount moving fluctuates on the basis of market conditions other than freight rates. Next we will determine if the rate structures on the recyclable commodities are just and reasonable.

Lead matte has an adjusted cost-ratio of 156 in the East and 171 in the West. The eastern carriers did not supply information as to the amount of tonnage moving over a period of years, however this data is supplied by three western carriers.

For the period 1970 through 1975, the MP averaged 9,896 tons with a high of 14,696 tons in 1971, to a low of 7,266 tons in 1972. The UP average 6,641 tons with a high of 9,807 tons in 1972 to a low of 2,958 tons in 1974. The SLSF from 1971 through 1975 averaged 9,954 tons, with a low of 3,452 tons in 1971 to a high of 18,003 tons in 1973. This fluctuation traffic indicates that increases in freight rates through general increases cannot be correlated to changes in the amount of traffic handled.

It is also noted that the recycling rate of lead (which includes all types of lead scraps, mattes, et cetera), as a percentage of lead metal consumption has remained relatively stable with a slight increase shown in recent years. This supports the conclusion that freight rate increases have not hindered the movement and consumption of this commodity. We, therefore, find that the rate structure for lead matte in the East, and the West, in view of all the evidence of record and the financial status of the eastern carriers, is just, reasonable, and nondiscriminatory.

The southern carriers did not supply us with any movements of lead matte in the South and neither did opposing shippers, therefore, we do not have an adjusted ratio of revenue-to-variable cost. We also do not have information as to the amount of this traffic moving over a period of years, so that it is not known whether general rate increases have had a detrimental effect on the amount

of traffic moving. NARI requests that rate on lead matte be lowered in the South by 32 percent. However, without evidence as to the cost involved in the movement of this commodity, we are unable to determine the effect of such a proposed reduction. Under the circumstances, a reduction is not warranted. However, we will order a further investigation into the reasonableness of lead matte in the South as set forth in our General Discussion and Conclusions.

Lead, zinc, or alloy scrap have an adjusted ratio of 186 in the East, 226 in the South, and 155 in the West. The value of lead and zinc scrap is 17.78 cents per pound for scrap zinc and 11.66 cents per pound for scrap lead in 1974. Although RSR restates that approximately 13 percent of battery weight is recoverable as metal, we have no indication of the recoverability ratio of zinc. We also note that the carrier movement of lead batteries causes damage to the car from acid leakage, although the exact cost of the damage is not known.

The average price per pound of lead scrap in relation to the price of virgin primary lead, has been from a high of 71 percent in 1966 to a low of 28 percent in 1971. These fluctuations in the price percentages also indicate no correlation between general rate increases and the price of the commodity. In fact, the percentage price of lead scrap to primary lead was lower for the period 1971 through 1975 (40 percent), than for the period 1966 through 1970 (56 percent). This also indicates that increasing freight costs are not pricing the scrap out of the market.

The rate of zinc scrap consumption as a percentage of total zinc metal consumption has been lower in recent years, down from a high of 36 percent in 1960 to 20 percent in 1974 and 23 percent (estimated) in 1975. The relationship between the price of scrap zinc and virgin slab zinc does not indicate, however, that a rise in price of zinc scrap compared to that of virgin slab zinc has caused a decline in the consumption of zinc scrap as a percentage of total zinc consumption. For example, the percentage of zinc scrap consumed as compared to total zinc consumption was 29 percent in 1969, and the price of scrap zinc was 44 percent of the price of virgin slab zinc. In 1972, however, the consumption of zinc scrap was only 23 percent of total zinc consumption although the price relationship of scrap to the virgin slab had decreased to 40 percent. Nor is there any correlation between the price fluctuation and general rate increases.

The tonnage of lead and zinc scrap carried by three western roads was reported for the period 1970 through 1975. The MP's tonnage

356 I.C.C.

fluctuated during this period averaging 68,926 tons, with a high in 1970 of 118,296 tons to a low of 41,226 tons in 1973. The UP average 32,527 tons, with a high of 43,154 tons in 1971 and a low of 21,168 tons in 1975. The SLSF for 1971 through 1975 averaged 507,050 tons with a high in 1972 of 821,959 tons and a low of 248,224 tons in 1973. Although opposing shippers contend that freight rate are limiting the movement of lead, zinc, or alloy scrap, no probative evidence was provided which would support these allegations or rebut respondent's evidence to the contrary.

Therefore, based on all the evidence of record we find that the rate structure on lead, zinc, or alloy scrap in the East, South, and West is just, reasonable, and nondiscriminatory.

Zinc dross, which contains from 11 to 23 percent recoverable zinc, has an adjusted cost ratio of 179 in the East, 214 in the South, and 151 in the West. The three western roads, the MP, UP, and SLSF were the only carriers to report data on the amount of tonnage moving over a period of years. From 1970 through 1975 the tonnage for the MP has increased overall with fluctuation in the amount carried in the interim, the tonnage for the UP has also fluctuated although there is a noticeable downward trend; and the SLSF has fluctuated up and down with no observable trend upward or downward. These fluctuations in traffic support the conclusion that in the West, general freight rate increases are not impeding the movement of zinc dross. We therefore find, based on all the evidence of record, that the rate structure of zinc dross is just, reasonable, and nondiscriminatory.

We also conclude that the rate structure on zinc dross in the East is not unjust, unreasonable, or discriminatory. Although the adjusted cost ratio is higher (179) than that in the West (151), based on the financial needs of the eastern carriers, the difference is justified. Although the eastern carriers did not supply data as to the amount of zinc dross originated over a period of years, there is no evidence of record to indicate that the freight rates or rate structure in the East is impeding the movement of this commodity. Although NARI contends that the recycling rate of zinc as a whole is decreasing, this is not correlated to increases in the freight rate. The decrease may also be explained by the uses of zinc in application (for example galvanizing), where recovery is technologically difficult or impossible.

Zinc dross has an adjusted ratio of 214 in the South. No reasons have been given to justify the ratio which is significantly higher than those in the East and West. We also note that very little of this

356 I.C.C.

traffic is originated in the South. Although the evidence indicated overall, that the freight rate on zinc dross are not impeding its movement, no specific evidence was presented by the southern carriers as to the amount of traffic originated or carried over a period of years. Therefore, we are unable to determine with exactitude the effect of general increases in the South for this commodity. However, the comparison of this ratio with those of the other territories is evidence that zinc dross in the South has a higher transportation burden than the movement of zinc dross in the other two territories. To remedy this situation we will order a 20 percent reduction on zinc dross rates in the South.⁸²

In conclusion, we find: (1) that the rate structure in the South on zinc dross is unjust and unreasonable and that a 20 percent reduction in rate is necessary; and (2) that further investigation into the rate structure of lead matte in the South is required as set forth in our "General Discussion and Conclusions" hereafter.

TIN SCRAP, TINPLATE AND ORE (STCC NOS. 40 219 60,
40 211 28 AND 10 929 85)

Primary production.—Cassiterite, tin oxide, is the only commercial mineral of tin. The principal areas of supply are in Asia, Africa, and South America. There are no known tin deposits of any economic size or grade in the United States although a potential source of supply may be located in Alaska. Primary tin is not always produced in the country in which the ore is mined.

The ore is mined by bucket-line dredging, gravel-pump and hydraulicking. Crude cassiterite is upgraded by washing, tabling, and magnetic or electrostatic separation. Recovery of tin is low, varying between 50 and 80 percent. It is smelted and further refined by liquating or sweating and boiling or lossing to remove unwanted purities. After refining is complete, the tin is cast into pigs for marketing. There is one tin smelter in the United States located at Texas City, Tex. Primary refined tin sold for 227.5 cents a pound in New York in 1973.

Secondary tin.—Tin is recovered principally from copper and lead-base alloys, tinplate scrap (cans) at detinning plants and tin-base alloys. There is little recovery from tin cans and the likelihood of recovery becoming economically feasible is not foreseen because of high costs of collection, loss of solution if the cans are not

⁸²The 1975 1-percent waybill sample had no movements of zinc dross originating in the South. The revenue reported by two southern carriers, the LN and SCL (\$18,553 combined) indicates that the reduction will have no adverse financial effect.

shredded, poor recovery of tin because of side seams, and the poor grade of recovered steel scrap because of residual lead and tin from the soldered seam.⁸³

The most widely used form of recovery is the alkalichemical process. It dissolves the tin from the steel using a caustic soda. Then by electrolysis the recovered tin can be refined to as high as 99.9 percent purity.

Of the total secondary tin recovered in recent years, over 80 percent was recovered as a component of bronze and brass, solder-type metal, babbitt (a white antifrictional alloy), and miscellaneous tin alloys. Less than 15 percent is recovered as metal and nearly 3 percent as chemicals.

Secondary tin furnishes about 25 percent of the total United States tin supply each year. The 20,477 long tons of secondary tin produced in the United States in 1973 was an increase of 1 percent over 1972. Five companies in 11 States were engaged in the detinning business in this year.⁸⁴

Consumption.—Tin is used principally as tin plates for cans, for transportation, machinery, electrical equipment and supplies, and plumbing and heating.

Approximately 30 percent of the total tin demand is met from secondary sources. About 85 percent of the total tin recovered is reclaimed as alloys. Secondary copper smelters and foundries recovered 45 percent of the total from copper-base scrap and smelters and refineries reclaimed 40 percent from lead-base and tin-base scrap. The remainder is recovered from tin plate scrap as metal.

The Bureau of Mines⁸⁵ projects that there will not be enough tin to meet the cumulative demand to the year 2000. However, it indicates that substitute materials such as aluminum, plastics, and tin-free steel will probably minimize the impact of the lessening of supply. If so, tin reserves are sufficient to meet the long-term demand.

The average delivered cost per long ton of tin plate scrap in 1972 was \$30.15 compared to \$48.90 in 1973.

Evidence presented.—Respondents have not reported movements of tin ore. Tin ore is generally smelted outside the United States and only tin in ingot form moves domestically. Tin scrap does not move

⁸³Mineral Facts and Problems, *supra* (1970), p. 770.

⁸⁴Minerals Yearbook, 1973, *supra*, p. 1215.

⁸⁵Mineral Facts and Problems, p. 770, (1970).
356 I.C.C.

in any significant volume in the United States. The reporting roads submitted the following on traffic handled.

TABLE 75A

Tin scrap (STCC No. 40 219 60)—Percentage of tonnage or revenue of involved commodity to total carrier tonnage or revenue

1975

STCC	Carrier	Carloads	Tonnage carried	Revenue from commodity
40 219 60	Frisco		27	\$149
	ICG	9	342	5,963
	LN	29	1,187	9,435
	SCL	7		
	SOU		816	

The L&N also reported that it originated 15 shipments of tin scrap which resulted in 10 different point-to-point movements. It selected one movement having four shipments for its repetitive movements. The Southern originated 816 tons in 1975. No repetitive movements were submitted.

Eastern railroads were unable to identify any bona fide shipments of tin scrap moving in official territory in 1975. Movements which were listed under STCC 40-219-60 were found to be shipments of tin plate scrap, STCC 40-211-28. These originated at the plants of tin can manufacturers or steel mills who produce tin plate. Tin plate is sheet steel with a microscopic layer of tin coating which is used to manufacture "tin cans." The industrial scrap generated by can companies consists of trimmings or skeletons of tin plate or rejected cans. This scrap moves to plants which detain it for steelmaking consumption. The detinner removes the tin and casts it into tin pig which generally moves in less-than-truckload (LTL) quantities to chemical plants. Because there are no pure tin articles in use, there is no movement of tin scrap. The movement of tin plate scrap is contained in examination of ferrous scrap movements under STCC 40-211.

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the TEA, SFA, and WRA. The number of movements shown include both inter- and intrastate traffic.

356 I.C.C.

TABLE 76

Average ratio of revenue to variable cost¹

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 929 85 - Tin ore			0		0	0
<i>Recyclable commodities</i>						
40 211 28 - Tin plate orterneplate scrap	103	1	154	12	132	1
40 219 60 - Tin scrap			0	175	1	0

¹Averages reflect weighted average ratio of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harrity of Western Railroad Association.

Comparison of respondents revenue-variable-cost ratios.—The comparison of ratios between virgin and recyclable commodities cannot be made as there are no movements of the virgin commodity, tin ore, in the evidence of record. This is due to the fact that tin ore does not originate in this country but is shipped in ingot form between points in the United States. There were no opposing shipper comments for this commodity group and respondents offered no rebuttal.

TABLE 77

E. Commission's adjustment of respondents' revenue-variable-cost ratios

AVERAGE RATIO OF REVENUE TO VARIABLE COST (PERCENT)¹

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
10 929 85 - Tin ore			0		0	0
<i>Recyclable commodities</i>						
40 211 28 - Tin plate orterneplate scrap	79	1	160	8	124	1
40 219 60 - Tin scrap			0	162	1	0

¹Based on interstate movements only.
356 I.C.C.

No comparisons can be made due to the lack of movements of tin ore in the evidence of record.

Comparison of Commission's results with respondents' results.—The Commission's results are similar to those of respondents. The only difference is for tin plate orterneplate scrap in the East where respondents show a ratio of revenue to variable cost of 103 percent versus a ratio of 79 percent in the Commission's results.

In summary, the following table best illustrates the comparison between revenue to variable cost ratios for virgin commodities and recyclable commodities.

Average ratios of revenue to variable cost (percent)

Virgin	East		South		West	
	Respond- ents	Com- mission	Respond- ents	Com- mission	Respond- ents	Com- mission
10 929 85 - Tin ore						
<i>Recyclable</i>						
40 211 28 - Tin plate orterneplate scrap	103	79	154	160	132	124
40 219 60 - Tin scrap			175	162		

DISCUSSION AND CONCLUSIONS

Tin ore does not originate or move within the United States. We, therefore, conclude that there is no competitive relationship between this virgin commodity and tin plate or scrap. Our analysis will, therefore, be restricted to a determination of whether the rate structure of these two commodities is just and reasonable.

The ratios of tin plate in all the territories are within the zone of reasonableness. In the East the ratio is 103 which is just slightly above variable costs. The South and West have higher ratios, (154 and 132 respectively), but these amounts do not appear excessive. Opposing shippers have expressed little interest in this commodity and have offered little if any evidence to rebut respondents' contention that the ratios are just and reasonable. Although respondents have provided no data on the amount of tonnage moving over a period of time or the percentage of rate to prices, considering the small tonnage moving and the numerous

commodities which are under investigation in this proceeding, their omissions are not fatal. We conclude that the rate structure is just and reasonable.

We also find that the rate structure on tin scrap is not unjust or unreasonable. Where no movements were presented, respondents have explained this lack of data by the fact that pure tin scrap as such does not move because of the nature of the commodity and the fact that it is generally alloyed with another metal. Where a movement was provided, in the South, the ratio of 175 is not excessive for the same reasons given in our discussion of tin plate.

Pulpwood, woodchips, woodpulp and wastepaper.—Section 204(e)(2) in defining virgin natural resource material specifically mentioned "woodpulp or pulpwood." In our order of April 2, 1976, we listed those two commodities and the recyclable paper waste or scrap. In a general sense, woodpulp, pulpwood, or wastepaper are raw materials from which various paper products are made. In the process, they pass through a pulp state and, therefore, NARI asserts, pulpwood and wastepaper compete. In order to determine their "full competitive relationship," a deeper analysis is required. For example, wastepaper is processed through a bladed hydropulper⁶⁶ and pulpwood is cooked in a chemical digester. Wastepaper is not substitutable for pulpwood in a digester and a hydropulper cannot tolerate pulpwood in place of wastepaper. Paper is a generic term. Actually, there are many grades of wastepaper and its consumption is concentrated in a narrow range. Almost four-fifths of the total amount of wastepaper recycled is for paperboard and of that amount 90-95 percent is used to make combination board. Thus, we must proceed to determine whether the designated raw materials are competitive.

Pulpwood is wood, cut in the form of logs in various sizes and shapes, and woodchips suitable for the manufacture of chemical or mechanical woodpulp. Woodchips are small, thin, pieces of wood cut and/or broken to a size suitable for consumption by a pulp mill digester. Woodchips may also be produced from residues from a plant manufacturing other forest products such as lumber and plywood.⁶⁷ In the 1950's, the introduction of debarking and chipping

⁶⁶A hydropulper is a steel tub, between 10 and 16 feet in diameter. At the bottom of the tub is a rotor about 2 to 3 feet in diameter. It has between three and six blades protruding from it. It is like a Waring blender. The rotor twists the material in a counterclockwise rotation in hot water and steam and the wastepaper breaks apart into its individual fibers.

⁶⁷A beginning trend is seen in the chipping of whole trees rather than as a byproduct in a lumber operation. While woodchips were not designated as a virgin natural resource material they are a form of pulpwood and will be considered as such herein.

equipment suitable for use at sawmills led, first in the West and later in other regions, to use of pulpwood chips produced in the manufacture of lumber. In 1966, 28 percent of total pulpwood consumption was from this source and had risen to 38 percent in 1974.

Pulpwood is composed of cellulose, lignin, carbohydrates, protein, resins, and fats. The bark and other impurities are removed from the wood by utilizing the soda, sulfite, sulfate, kraft, or other chemical processes or mechanical means so that only the fibers in the cellulose and lignin that bind these fibers remain. The various processing steps termed debarking, chipping, screening, cooking, and bleaching result in a white blottery substance of nearly pure fiber called woodpulp. The woodpulp either flows directly to paper making machines in an integrated mill or is marketed and sold as dry baled woodpulp. The various processes of transforming pulpwood to woodpulp are used to make different paper products.

Ground woodpulp is primarily used for newsprint and printing paper. It is produced by mechanically grinding the wood or otherwise forcibly separating the fibers from resinous binders in which case lignin remains in the pulp but the fibers are shorter. The resulting product generally must be strengthened by adding chemical pulp to the mix. Sulphite pulp is used to make printing and business grade papers and tissues. It is produced by combining the wood with a sulfurous acid and a chemical base material at a low heat. Sulphate or kraft pulp which is used principally in paperboard and coarse paper grades is derived by the chemical reaction of caustic soda and sodium sulfide and makes the strongest fibers. Semichemical pulp is used mostly for corrugated material for paperboard mills and is made from woodchips by mild chemical reaction followed by mechanical grinding to separate the wood fibers used mostly for corrugated material for paperboard mills.

Woodpulp in bales or wetlaps is interchangeable to some degree with wastepaper. Both are repulped in a hydropulper. About 87 percent of the woodpulp produced domestically is used at the same site as the paper and/or paperboard machines which require it. In such an integrated operation the pulp is in slush form. Small quantities of slush pulp may be partially evaporated to produce wetlap pulp which facilitates movement over relatively short distances in tanker-type vehicles. But the bulk of woodpulp which moves between domestic mills is dried to a 10-percent moisture content and is usually made up into bales of thin sheets which are suited to rehydration in a consuming paper or paperboard plant.

356 I.C.C.

Of the 300 companies in the pulp, paper, and paperboard industry, 224 obtained all of their fiber requirements by purchasing woodpulp, wastepaper, or other cellulose fibers.

Most of the 76 woodpulp producing companies which also made paper purchased some dried woodpulp from domestic and foreign sources of supply because of fiber characteristics or geographic considerations. The domestic shipments from pulp mills together with imports and exports of dried woodpulp totaled 8,042,000 short tons in 1975 compared to total consumption of 40,480,000 short tons.

Wastepaper which has been collected, sorted, and graded to meet the specifications of consuming industries is termed paper stock. There are several types of paper stock. One is termed "broke" (unusable paper from side trim by off-quality production, or by machine breaks) which is internally generated and recycled as waste woodpulp within the plant in which it was produced. It is not transported outside a papermill. The other two are conversion waste and obsolete paper which fall into two categories: bulk and high grades. Bulk grades are used to make paperboard and construction. These bulk grades consist of: news, which are old newspapers recovered from residential sources; corrugated old boxes and clippings recovered from commercial establishments; and mixed, which is office waste obtained from industrial plants and office buildings. High grades which are broken down into "pulp substitutes" come from converting plants in forms of clippings and shavings from products such as envelopes, and "deinking" which consist primarily of bleached paper obtained from printing plants.

Wastepaper is used in a mechanical agitator or hydropulper in a water slurry sometimes heated, where the fibers are separated. In the deinking process the contaminants or impurities are removed by slushing, cooking, washing, bleaching, and screening.

The following table shows the amount and grades of wastepaper used in the various paper and paperboard products in 1974.

356 I.C.C.

TABLE 77A

Waste paper in paper and paperboard manufacture

IN PAPER AND PAPERBOARD MANUFACTURE

ACTUAL CONSUMPTION - 1974

END PRODUCT Thousands of Short Tons	U.S. Paper & Paperboard Production	GRADES OF PAPER STOCK				Pulp Subs. & High Grade Drinking
		Total Waste Paper Consumption	Mixed Papers	News- papers	Corre- lated	
TOTAL ALL GRADES AND MOLDED PULP	61,010	14,196	3,118	2,408	5,716	2,955
TOTAL PAPER	26,867	2,663	161	506	137	1,859
NEWSPRINT	3,481	406	-	406	-	-
PRINTING, WRITING AND RELATED	13,344	897	27	-	-	870
UNBLEACHED KRAFT PKG., IND. CONV.	5,956	263	43	12	22	186
SPECIAL INDUSTRIAL AND OTHER	4,085	1,097	91	88	115	803
TISSUE						
TOTAL PAPERBOARD	28,915	9,890	2,051	1,548	5,294	997
UNBLEACHED KRAFT AND SOLID BLEACHED	17,106	559	126	1	401	30
SEMI-CHEMICAL	4,175	880	75	42	756	7
RECYCLED	7,634	8,451	1,850	1,504	4,136	960
CONSTRUCTION PAPER AND BOARD, MOLDED PULP AND OTHER	5,228	1,643	906	354	285	98
DISTRIBUTION	-	100.0%	22.0%	16.9%	40.3%	20.8%

356 I.C.C.

Waste paper in paper and paperboard manufacture-Continued

FUTURE PLANS 1975-1978

END PRODUCT Thousands of Short Tons	1975	1976	1977	1978	PAPER STOCK GRADES Mixed Papers: Number 1 & 2 mixed papers, super mixed papers, boxboard cuttings, mill wrappers. Newsprint: Number 1 news, over-issue news, super news. Any grade to be used as a news substitute. Corrugated: Old containers both corrugated and solid fiber, container plant cuttings. Pulp Substitutes & High Grade Drinking: Ledger, tabulating cards, bleached sulphate shaping (unless used as a news substi- tute). Envelope and bleached sulphite and sulphate cuttings, book and magazine stock, news and publication blanks, kraft paper and bags, and all other grades not classified above.
TOTAL ALL GRADES AND MOLDED PULP	15,646	16,035	16,250	16,250	
TOTAL PAPER	2,905	2,971	3,041	3,041	
NEWSPRINT	483	495	495	495	
PRINTING, WRITING AND RELATED	957	998	1,031	1,031	
UNBLEACHED KRAFT PKG., IND. CONV.	270	270	270	271	
SPECIAL INDUSTRIAL AND OTHER	1,195	1,208	1,244	1,244	
TISSUE					
TOTAL PAPERBOARD	10,981	11,290	11,434	11,434	
UNBLEACHED KRAFT AND SOLID BLEACHED	794	810	834	834	
SEMI-CHEMICAL	935	1,046	1,018	1,018	
RECYCLED	9,252	9,434	9,552	9,552	
CONSTRUCTION PAPER AND BOARD MOLDED PULP AND OTHER	1,760	1,774	1,775	1,775	

356 I.C.C.

We now turn to the uses of the major grades of wastepaper and the volume produced in 1974. Newspapers are recycled into newsprint, paperboard, building products, and molded paper products and amounted to 2.4 million tons. Used corrugated boxes and corrugated box plant clippings which are used to make kraft linerboard and corrugating medium (the center ply of fluted paper between two outer plies of linerboard which comprise a corrugated box) and recycled paperboard totaled 5.7 million tons. Mixed papers which are recycled to make paperboard and building products amounted to 3.1 million tons. Pulp substitutes and high-grade deinking which are used in the manufacture of printing and writing paper as well as high quality (unbleached craft packaging materials) amounted to 3 million tons.

The U. S. paper industry consists of about 725 mills of which about 225 are recycled paperboard mills generally using about 97 percent wastepaper as their raw material. The specifications for certain finished products requires about 2 to 3 percent woodpulp on an annual basis in these mills.

Another 200 mills use woodpulp and wastepaper in various blends to make paper, tissue, and specialty paper products. Wastepaper and woodpulp are interchangeable in those mills and are furnished in varying percentages to the hydropulpers for each machine run.

Some 300 mills use about 90 percent pulpwood and chips cooked in a digester, as their principal raw material. They generally use some wastepaper and have equipment to repulp high-grade wastepaper, in a hydropulper and they repulp their own "broke."

About 50 kraft and semichemical mills dependent on pulpwood (85-90 percent) also use wastepaper (10-15 percent) but again the pulpwood is cooked in a digester and the wastepaper is repulped in a hydropulper. The papermaking fibers are not blended until they reach the forming end of the paper machine or a storage chest where mixing takes place. At these mills it has been more economical to add a small digester capacity, while at the same time maintaining quality.

In summary, in those 350 mills which use pulpwood and woodchips for 85-90 percent of their needs and wastepaper for the remainder, the relationship between pulpwood and wastepaper is complementary rather than competitive. This established by the disparate proportions of raw materials used, the differing chemical processes by which pulpwood is cooked in a digester and wastepaper is repulped in a hydropulper. This limited use of wastepaper is an

insufficient basis upon which to base a finding of competition. In the approximate 225 recycled paperboard mills which use about 97 percent wastepaper and the remainder woodpulp, the commodity relationship is also complementary and not competitive because the amount of woodpulp is so small. In the 200 mills which use woodpulp and wastepaper in various blends, in order to produce particular types of paper and paper products the relationship is complementary. We thus conclude that respondents have established that there is no real, genuine, substantial general competition between wastepaper, on the one hand, and pulpwood, woodpulp or woodchips, on the other. We have examined the industry on a general basis because our mandate is to examine the rate structure and not individual rates. Despite the foregoing conclusion we will examine the rate structure and transportation characteristics in regard to these virgin commodities and recyclables to see if they pose any impediment to the movement of wastepaper or are unjustly discriminatory or unjust or unreasonable.

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the Eastern Railroads, Southern Freight Association, and the Western Railroads. The number of movements shown includes both inter- and intrastate traffic. At the end of this section is an indepth discussion of the revenue and cost data, revenue to cost ratios and other evidence related to it submitted in this investigation.

TABLE 78

Respondents' average ratio of revenue to variable cost

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movement	Ratio	Number of movements
24 114 10 - Pulpwood or pulpwood logs	67	66	97	390	103	34
24 115 - Woodchips	61	21	-----	0	-----	0
26 111 - Pulp	189	42	186	146	171	40
<i>Recyclable commodities</i>						
40 24 - Paperwaste or scrap	124	101	138	125	148	40

TABLE 79

*Commission's adjustment of respondents'
revenue-variable-cost ratios*

AVERAGE RATIO OF REVENUE TO VARIABLE COST (PERCENT)

STCC Virginia commodities	East		South		West	
	Ratio	Number of move- ments	Ratio	Number of move- ments	Ratio	Number of move- ments
24 114 10 - Pulpwood or pulpwood logs	85	5	90	139	123	43
24 115 - Woodchips	83	9	---	0	106	23
26 111 - Pulp	186	35	187	126	185	33
Recyclable commodities						
40 24 - Paperwaste						
- or scrap	120	22	169	8	149	31
Virgin Commodities						
Overall weighted average ratio	130	49	108	265	132	99

¹Based on interstate movements only.

Wastepaper generally moves on commodity-column rates at minimum weights ranging from 30,000-100,000 pounds depending upon the size of the car. Effective May 16, 1976, the rates were substantially reduced in the South for movements of 100,000 pounds or more and a major paper recycler urges that the Southern scale be established throughout the country. Eastern respondents are considering reductions in some 80,000- and 100,000-pound incentive rates to meet motor carrier competition.

In the past, poor baling practices and lack of proper material handling equipment, and small boxcars with narrow door openings resulted in light wastepaper loads running between about 40,000 and 43,000 pounds. Realizing the need to improve the density of the bale, paper stock dealers, the paper industry, mills, and fabricating plants invested in improved baling machines and modern handling equipment. The railroads invested in larger cars with wider door openings and greater carrying capacity. There are now 50 foot and 60 foot cars capable of handling 70 ton loads. There are also 60-foot high cube boxcars with even greater carrying capacity both in volume and weight.

356 I.C.C.

As a result of the foregoing improvements in regard to wastepaper, between 1961 and 1973 the average tons per car increased 42.3 percent from 26 to 37 tons, and the average revenue rose 17.7 percent from 39 to 45.9 cents per 100 pounds. The result of the heavier loading along with increased rates was a 67-percent increase in average per-car revenue from \$203 to \$339 per car and a 59.6-percent increase in per-car mile revenue from 57.6 to 91 cents. To afford some indication of comparative rail traffic statistics for example, the following table shows that between 1970 and 1974 the western district respondents increased their handling of pulpwood, woodchips, and wastepaper in terms of tonnage, carloads, average tons per car, and revenue although there were fluctuations in the intervening years in all categories except revenue. The largest percentage increase is in wastepaper although it still loads lighter than pulpwood or woodchips.

TABLE 80

*Freight commodity statistics class 1
railroads western district*

		Carloads	Tons	Average tons	Revenue
24-114 Pulpwood -----	1974	237,954	14,018,492	58.91	\$36,212,000
	1973	212,840	12,395,500	58.23	27,056,000
	1972	219,062	12,824,786	58.54	26,153,932
	1971	229,498	13,095,698	57.06	25,079,411
	1970	237,745	13,465,418	56.63	23,859,343
24-115 Woodchip -----	1974	254,501	15,174,170	59.62	57,555,000
	1973	264,466	15,626,289	59.08	50,258,000
	1972	258,475	15,055,233	58.24	46,674,629
	1971	255,176	14,472,599	56.71	41,240,514
	1970	246,895	13,663,332	55.34	34,705,528
4024 Wastepaper -----	1974	92,764	3,561,321	38.39	22,991,000
	1973	71,167	2,733,723	38.41	15,816,000
	1972	67,131	2,532,054	37.71	14,233,819
	1971	63,728	2,400,399	37.66	13,371,414
	1970	66,006	2,427,919	36.78	12,033,101

Although the total tonnage of wastepaper has been increasing at an average annual rate of about 4 percent its share of the total raw material mix has declined from about 35 percent in 1944 to 22 percent in 1974. This has also been referred to as the rate of recycling. Some of the reasons ascribed to this decline are uncertain supply in high periods of demand, unsatisfactory quality, and improved technology in processes using primary fiber not matched in the processes using wastepaper.

356 I.C.C.

Turning to woodpulp, scale rates apply in the South and some were reduced in 1975 to meet motor carrier competition. In the West woodpulp on the average moves about 129 miles and weighs about 59 tons.

In 1974, 76 percent of the woodpulp originating in the U.S. and 97 percent of the woodpulp terminating in the U.S. moved by rail whereas 65 percent of wastepaper moves by motor carrier. Woodpulp originated by southern district carriers increased by 39 percent to almost 2.8 million tons from 1967 through 1974. During this same period wastepaper originations went up 71 percent to 1.6 million tons. Woodpulp revenue per ton, based on tons carried, increased 91 percent to about \$33.5 million while scrap paper revenues rose 69 percent to about \$14.5 million. It should be noted that most woodpulp production is not available for transportation. For example, in 1971 while 28.5 million tons or 65 percent of total production (U.S.) of woodpulp was in the South the southern railroads only handled 2.3 millions tons or 8 percent.

Pulpwood in the South moves on scale rates which were introduced gradually in 1973 and 1974 on interstate and intrastate traffic as the result of a joint cost study between the paper industry and the railroads. The effect was to change the relationship of rate to distance and to wipe out intrastate rate arrearages resulting in increases from 37 percent on certain interstate traffic to as much as 80 percent in some Mississippi traffic. Pulpwood moves short distances and is highly sensitive to motor carrier competition. In the South it moves on average of about 138 miles and the average loading is about 68 tons. In the West it moves about 188 miles with an average load of 59 tons.

Pulpwood requirements in the United States are expected to be 13 percent higher in 1979 than 1974, with a total increase exceeding 9 million cords, 8 million of which is expected to be in the form of woodchips. Rail deliveries are expected to increase by 18 percent, from 30.8 million cords in 1974 to 36.3 million cords in 1979.

The joint cost study⁸⁸ in the South which required about 2 years disclosed that, because of peculiar traffic characteristics in handling pulpwood and woodchips their transportation costs were less than those reflected in system or territorial averages. These factors included, for example, fewer origin and destination switching minutes per loaded car, less origin and destination station clerical

⁸⁸An outgrowth of I. & S. Docket No. 8844 Pulpwood and Wood Chips Within SFA Territory. See the discussion at the end of this section for a more complete review of the joint study.

costs per carload, lighter average weight of the train and fewer locomotive units per train. The joint study indicated that the rates yielded 111 percent of pulpwood variable costs and 109 percent of woodchips costs. The results of this intensive study into the specific costs of handling pulpwood and woodchips in the South indicates that the rates on those commodities cover variable costs. In addition the relationship of those special study factors to the territorial averages have a bearing on the rates in official territory. For example the joint study indicated that the origin switching minutes for pulpwood in SFA territory were approximately one-third of the territorial average switching minutes per carload. Application of this percentage to the official territorial average terminal switching time of 27 minutes equals 9 minutes per carload. The application of unit costs in the East which reflect adjustments from the joint cost study provide a more accurate determination of variable costs than the application of unadjusted territorial averages. The conclusion that the rates on pulpwood and woodchips exceed variable cost is also supported by the overall weighted average ratio of those virgin commodities and woodpulp.

Turning to woodpulp and wastepaper the rate/variable cost ratios as adjusted for woodpulp is around 185 while wastepaper ranges from 120 in the East to 169 in the South. The ratios on wastepaper range from 120 in the East to 169 in the South.

NARI contends, in regard to the question of transportation circumstances and conditions that the recyclables have the most favorable or equally favorable characteristics by comparing the types of car utilized, weight of the shipments and the revenue per car. NARI concludes that considering that wastepaper moves in boxcars with lighter loads, with the "best possible empty return ratio" and higher rates and pulpwood travels in flatcars with the highest empty return ratio the rate structure for the two commodities is obviously unreasonable and discriminatory.

The allegations as to comparative empty return ratios are unsupported and too general to be of any probative value. Our review of the entire record reveals essential differences in the transportation characteristics between these recyclable and virgin commodities. Pulpwood is a heavy loading commodity often moving in multiple car shipments in rack cars or gondolas for short distances from gathering points in forests to papermills. Wastepaper moves in boxcars from large metropolitan areas in single-car shipments. Woodchips move from forests in open hopper cars often

356 I.C.C.

dedicated to the service or in closed cars requiring paper doors or wooden slats. The rates on these commodities have been established without reliance on any intercommodity relationship. These differences are reflected in the rates. There are trainload movements of pulpwood with loads of over 70 net tons per car. There are also incentive rates in the form of per car rates with reduced charges for excess weight. The commodities generally move from and to disparate origins and destinations. A train of 20 or more cars loaded with pulpwood logs or woodchips can be transported to a single-mill destination on a regular schedule. High grade wastepapers such as envelope cuttings would move from several metropolitan areas and move in single cars to the mill since sufficient volume is difficult to accumulate at one origin.

The evidence including a review of the 1-percent waybill sample for 1974 indicates in general that virgin commodities move in multiple car shipments whereas there was only one multiple car shipment of recyclable commodities. This is reflective of the difference in traffic characteristics between virgin commodities and recyclables. Papermills using virgin fiber are located near the forests whereas papermills using wastepaper tend to locate near metropolitan areas and rely principally on motor transportation. Mixed office waste, for example, is generated in cities. Its prices are low and it moves predominantly by truck for short distances. In times of shortage, however, low grade wastepaper moves long distances by rail. For example, in 1974 a recycler of newsprint obtained newspapers from across the country. During shortages newspapers have moved from the East to the West coast. The fact that rail freight rates carried these wastepaper shipments is evidence that the rail rates do not impede the movement of this recyclable.

High grade wastepaper 80 percent of which is recycled regularly moves long distances by rail and such rates do not impede its movement. Other statistics lead to the same conclusion.

Between 1958 and 1975 southern district originations of wastepaper more than doubled from 582,000 tons to 1.3 million tons but 681,191 tons, or 66 percent of the total growth over this period, took place in the 8 years subsequent to 1966. Total tons handled increased during the 17-year period by 1,485,371 tons annually but 67 percent or 994,891 tons took place in the 8 years after 1966. From these statistics it is evident that rail freight rates have not impeded the growth of wastepaper traffic in the South nor have the general revenue increases retarded the growth of that recyclable commodity.

Examination of consumption data shows that between 1967 and 1974 woodpulp use rose over 31 percent, wastepaper consumption increased 39 percent and pulpwood rose over 34 percent. Freight rates during this period did not impede the growth of wastepaper consumption. It is also noted that about 65 percent of the wastepaper movement is by truck. One further point-pulpwood takes 2 tons to produce a ton of fiber while 1 ton of wastepaper yields 1,800 pounds of fiber albeit of lesser quality since each time fiber is recycled it is damaged and qualifies for lesser use. Therefore, even assuming that wastepaper is competitive with pulpwood it could pay higher rates than pulpwood and make a greater contribution to the railroad burden without affecting its attractiveness to paper mills.

Freight rate increases between 1966 and 1976 have had no discernible effect on the demand for wastepaper. The rail rate increases within the East on woodpulp, pulpwood, and wastepaper as a percentage of the 1967 freight rate to and including Ex Parte No. 318 show that, using the 1967 rate as base 100 woodpulp rates increased to 193.8, wastepaper to 199.6 and pulpwood rose to 219.8. Thus the increases on wastepaper reflect relatively the same percentage as those on pulpwood and less than that for pulpwood.

The wholesale price indices (WPI) show that for woodpulp in April 1975, it was 284.1 and a year later it had increased only 1.16 percent to 287.4. Wastepaper on the other hand in the same period rose from 95.8 to 184.2 an increase of 92.8 percent. These sharp price fluctuations for wastepaper cannot be correlated with increases in rail freight rates. Examination of comparative wholesale price indices for earlier periods shows similar results, a noncorrelation between railroad rates and fluctuations in wastepaper prices.

The evidence shows that freight rates are not generally a significant part of the total cost of pulpwood, woodpulp, woodchips or wastepaper; that factors other than rail freight rates are of major significance in the decision of paper mills to invest in virgin or recycling equipment; that most wastepaper moves by motor carriers and most woodpulp transported moves by rail. Where woodpulp and wastepaper are used side-by-side to maximize a mill's output the wastepaper, most of which moves by truck, is drawn from nearby sources and does not involve the use of rail transportation. As to those articles, mills or factories where the mean transport price of wastepaper is a large percentage of delivered price railroad

participation is generally minimal; and the rates are justified by the cost of transportation and other transportation conditions. Upon consideration of all the evidence of record we find that the rate structure on wastepaper, woodpulp, pulpwood, and woodchips is just and reasonable and not unjustly discriminatory.⁸⁹

The above finding will not have a significant effect on the environment. In our final environmental impact statement, the conclusion was made that transportation costs would have only a small impact on the utilization of wastepaper. This small impact on utilization, however, was carefully considered in the FEIS because: (1) utilization of wastepaper can conserve valuable forest products, (2) production of paper from wastepaper is more environmentally efficient than production from pulpwood, and (3) wastepaper is the largest single constituent (about 40 percent) of post-consumer solid waste. It was concluded therein, that while environmental and resource problems do exist, freight rates will not influence the solution of those problems.

DISCUSSION OF REVENUE AND COST DATA AND REVENUE-TO-COST RATIOS FOR PULPWOOD, WOOD CHIPS, WOOD PULP, AND WASTE PAPER

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the Eastern Railroads, Southern Freight Association, and the Western Railroads. The number of movements shown includes both inter- and intrastate traffic.

TABLE 80A

Average ratio of revenue to variable cost¹

STCC virgin commodities	East		South		West	
	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments
24 114 10 - Pulpwood or pulpwood logs--	67	66	97	390	103	34
24 115 - Wood chips	61	21	.....	0	.....	0
26 111 - Pulp	189	42	186	146	171	40

See footnote at end of table.

⁸⁹API filed motions to strike portions of the verified statements of two witnesses for NARI on the grounds that they contained hearsay, objectionable argument or were not shown to be competent. The motions were overruled at the oral hearing and are pressed in the reply brief of API. The ruling of the Administrative Law Judge is affirmed.

Average ratio of revenue to variable cost¹—Continued

STCC virgin commodities	East		South		West	
	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments	Number Ratio of move- ments
<i>Recyclable commodities</i>						
40 24 - Paper waste or scrap	124	101	138	125	148	40

¹Averages reflect weighted average ratio² of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harranty of Western Railroad Association.

Paper waste (40 24) v. pulpwood logs (24 114 10), woodchips (24 115) and pulp (26 111).—The weighted average ratio for the three virgin commodities in the East is 71 percent, which is below the ratio of 124 percent for the recyclable commodity.

In the South, the ratio of 138 percent for the recyclable commodity, paperwaste, falls between the ratios of 97 and 186 percent for the two virgin commodities. There were no movements of woodchips submitted by the Southern Freight Association. The weighted ratios for pulpwood logs and pulp is 106 percent. This weighted average, computed by the Commission, is based on carloads inasmuch as they were the only figures available for the South. Thus, the ratio for the recyclable commodity is higher than this weighted average ratio for the virgin commodities in the South.

In the West, the ratio for the recyclable commodity, 148 percent, falls about midway between the ratios for the two virgin commodities. Since these ratios are simple average ratios and are not weighted by either tons or carloads, the only comparison that can be made is of the simple average of the ratios for the 74 movements of virgin commodities in the West which is approximately 140 percent. This simple average ratio is slightly less than the 148 percent shown for the recyclable commodity.

Supporting shipper comments.—American Paper Institute (API) attempts to review the status and utility of Rail Form A costs with reference to the experience of the Southern Paper Traffic Conference (SPTC) in conducting a joint cost study with SFA. This study was made to determine the objective rail transportation costs for moving pulpwood and chips to papermills in the South.

This cost study was made in connection with I. & S. No. 8844, *Pulpwood and Wood Chips Within SFA Territory*. It was the result of a joint effort by two transportation cost consultants, Gerald W. Fauth, Jr., representing the railroads, and L. E. Peabody, representing SPTC. The final results of that study indicated that rates on pulpwood yielded 113 percent of variable costs, while woodchips yielded 107 percent.

Rail Form A costs v. specific cost studies.—API asserts that the use of Rail Form A costs, as employed by the Commission in its so-called "Burden Study" are not representative of the costs for moving pulpwood or woodchips in the Southern Territory. The aforementioned joint study of pulpwood and woodchip traffic showed the differences in the operating characteristics and traffic for those commodities on the one hand, and regional averages on the other. A table in API's statement compares the results of the joint cost study and 1972 Southern Region System Average factors.⁹⁰ This table shows that in some instances large differences exist between the factors developed in the joint study and the 1972 regional average statistics. API's conclusion is that Southern Region System average operating characteristics are not applicable to the movement of pulpwood and woodchips, and that such economies as shown in the statistics from the joint cost study should be reflected in the Burden Study.

API disputes the ratio of revenue to variable cost shown by SFA for pulpwood and pulpwood log movements in the South. API adjusts the costs for these movements using the traffic and operating characteristics developed in the SPTC/SFA joint study, previously mentioned.

Using the revenues, route of movement miles, average loading and number of interchanges from SFA's traffic study, API develops a ratio of revenue to variable cost for pulpwood traffic in the South. The revenue used to develop this ratio is the average revenue per carload (\$188.67) from SFA's traffic study, as stated above. The variable cost per carload is the result of applying 1974 Rail Form A unit costs for the southern region, adjusted by the factors taken from the joint study cited above, to the operating characteristics of SFA's traffic study. This results in a variable cost per carload of \$165.41 and a ratio of revenue to variable cost of 114 percent ($\$188.67 \div \165.41).

⁹⁰From *Rail Carload Cost Scales, 1972*, ICC Statement No. IC1-72, October 1974.

This ratio of revenue to variable cost of 114 percent may be compared to the ratio of 96.6 percent shown by SFA in their revenue-cost summaries.

API maintains that the reductions in costs associated with the movement of pulpwood in the South are applicable in other territories because the same characteristics of pulpwood movements that result in cost reductions to the carriers in the South also exist in other territories.

While API does not recommend the direct substitution of traffic and operating characteristics developed from the field studies in SFA territory for application in other territories, the relationship of special study factors to territorial averages should apply. As an example, API maintains that if origin switching minutes per car for pulpwood in SFA territory are one-third of the territorial average, then this percentage should be applied to the territorial average in other territories.

API (witness Banks) examines the railroads' analysis of pulpwood movements. An examination of both the costing procedures and traffic samples presented by the Eastern Railroads, the Southern Freight Association (SFA), and the Western Railroad Association (WRA) leads API to the conclusion that the significant cost characteristics of pulpwood movements have not been adequately considered by the three railroad groups. API's analysis of the submission of each railroad group follows.

1. *Eastern railroads.*—API criticizes some of the adjustments made by the eastern railroads and also criticizes eastern railroads for the failure to make other adjustments. These criticisms make the ratio of revenue to variable cost of 67 percent for pulpwood in the official territory suspect. Specifically, API discusses:

A. *Interstate v. intrastate movements.*—Eastern railroads' traffic sample for pulpwood consists of a total of 66 movements, only 5 of which are interstate movements with the remaining 61 movements being intrastate movements. API shows that the results for the 66 movements, broken down between inter- and intrastate movements, show different results. The weighted average ratio of revenue to variable cost for the 61 intrastate movements is 66.8 percent, and the weighted average ratio for the 5 interstate movements is 90.8 percent.

The reason for this disparity is that interstate movements involve longer hauls, and the terminal costs weigh more heavily on the shorter haul intrastate movements.

B. *Official territory Rail Form A costs.*—API criticizes the use of official territory costs because such costs are heavily weighted by the poor financial results of the Penn Central, and thus are not applicable to the assessment of future conditions in the East. Despite this, the seven movements of pulpwood handled exclusively by the Penn Central show high ratios of revenue to variable cost. The weighted average ratio of revenue to variable cost for the seven movements is 154 percent. API points out that the ratio for one of these movements is 184 percent; but that this is a movement of 1241 miles—a very long distance for pulpwood.

In addition, four of the seven movements terminate in Erie, Pa., and are a special service set up between Penn Central and local shippers for shipping pulpwood to Hammermill Paper Co. in Erie, Pa. This is obviously a profitable operation for the Penn Central.

C. *Car age and capacity.*—API asserts that some pulpwood traffic of the Maine Central and Bangor and Aroostook is carried in old cars, 25 years or more in age, with a maximum capacity from 88,000 to 110,000 pounds, or in cars which have a structural deficiency limiting the maximum load to 90,000 to 110,000 pounds. Eastern railroads have given no weight to such situations in its cost computations for movements of pulpwood over these railroads.

In addition, API maintains that the traffic handled in such old, light-loading cars, which are kept in service for the convenience of the carrier, produces unfavorable revenue-cost relationships due to low revenues and higher than average costs. API maintains that this is because the depreciation charges embodied within the *Rail Carload Cost Scales* are based on average depreciation for all cars new and old, causing the costs for movements of pulpwood in these old cars to be overstated.

D. *Eastern railroads' data.*—API compares data received from the field by officials of API member companies for certain movements of pulpwood in the East to data shown by the Eastern Railroads for the same movements. API asserts that, based on five movements of pulpwood in the East, that the eastern railroads have not properly considered the savings involved in multiple-car handlings and reduced car detention.

E. *Inappropriate determination of multiple-car cut size.*—Eastern railroads mistakenly assumes that if a car moves under a single-car rate, that it must be costed as a single-car movement. API cites five destinations in the East at which 10,948 of the 12,198 carloads in the eastern railroads submission terminated.

Making an assumption of daily switching service by the terminating railroad, API shows that the average number of cars per

day terminated at these five selected destinations ranges from 3.4 cars per day at Big Island, Va., to 13.1 cars per day at Millinocket, Maine. Because the number of carloads terminated at these five points was 89.7 percent (10,948 of 12,198) of the carloads in the eastern railroads' traffic study, it is clear that multiple-car handling of pulpwood cars in the East is very common and not a rare occurrence as eastern railroads would imply.

2. *Southern Freight Association (SFA).*—API finds the following deficiencies in SFA's results for movements of pulpwood:

A. *Inappropriate treatment of multiple-car movements.*—SFA fails to make any adjustments for cost savings associated with multiple-car or trainload movements. An example cited by API is the movement of pulpwood from West Union, S.C. to Canton, N.C., which moves an average of at least 3.2 cars per day. SFA neglects this fact and makes no adjustment to the cost of the movement.

API cites the December 1974 agreement reached between the SFA territory carriers and the Southern Paper Manufacturers Traffic Conference regarding the costs and revenues applicable to the movement of pulpwood in SFA territory. This joint study was described in detail in API's opening statement. A comparison of the relative weighted operating statistics applicable to the movement of pulpwood with the southern region average factors for the year 1972 is shown in it. This table shows that origin switching for pulpwood is only one-third of the system average and destination switching is approximately 60 percent of the system average. API contend that the obvious conclusion from this is that there are significant multiple-car movements of pulpwood in the South.

Continuing to cite the joint field study, API notes that the ratio of revenue to variable cost for pulpwood in the South was approximately 111 percent, in contrast to the ratio of 96.6 percent shown by SFA.

B. *Intrastate v. interstate.*—API separates SFA's results for pulpwood between interstate and intrastate movements. Without adjusting SFA's results, API shows that the ratio of revenue to variable cost for the interstate movements of pulpwood is 100.1 percent while the ratio for intrastate movements is 94.4 percent.

API maintains that SFA has overstated the costs for pulpwood movements by (1) using Rail Form A average costs which inadequately allow for the efficiencies of pulpwood traffic, (2) failing to apply the findings from the joint study undertaken in I. & S. Docket No. 8844, *supra*, and (3) including intrastate movements.

3. *Western Railroads (WRA).*—API finds the following deficiencies in the submission of WRA with respect to the movement of pulpwood traffic:

A. *Intrastate v. interstate.*—API separates the 29 WRA movements between interstate and intrastate. API develops a separate weighted average ratio for the 20 interstate movements and 9 intrastate movements. (Five movements were eliminated from the WRA results due to lack of data for tons or carloads.) A comparison of the separate results shows an average ratio of revenue to variable cost of 111.5 percent for the interstate movements and 94 percent for the intrastate movements.

Thus, the average of 111.5 percent is the applicable ratio instead of the 107.5 percent shown by WRA. The reasons stated in API's comments on the eastern and southern results also apply to the West.

B. *Multiple car cuts.*—Although WRA has made provisions in its general cost procedures to adjust costs for multiple-car and trainload movements, API could not determine that any such adjustments were made for movements of pulpwood. API contends that the records of numbers of cars indicate that multiple-car handlings must have occurred, and information provided by local officials of API member firms confirm that this was the case.

In one case, for a movement of pulpwood logs from Trout Lake, Mich. to Groos, Mich., WRA shows a ratio of revenue to variable cost of 92 percent even though the rate is one a cost-plus basis from an agreement between the carrier and the shipper.

API costing of selected movements.—API reviews and recalculates the results for five movements in each territory. API uses the unit costs presented in the statement of witness Harrity of the western railroads, supplemented by the following adjustments:

1. Pulp rack cars were treated as having a 100-percent empty-return ratio.
2. Tare weights were taken from 1973 ICC *Rail Carload Cost Scales* or from the verified statement of Witness Harrity.
3. Where railroad or shipper-supplied information indicated movements in excess of one carload per day, based on 365 days of rail service per year, multiple-car adjustments were made.
4. Multiple-car adjustments were made at destinations where it was apparent that substantial numbers of carloads were delivered from differing origins each day.

356 I.C.C.

5. Special service costs per carload were reduced to reflect the fact that most of these services do not properly pertain to pulpwood traffic.

6. Where multiple-car movements existed, adjustments were made to inter- and intratrain switching and industry switching costs. These costs were adjusted by the size of the cut based upon a study of Chesapeake and Ohio Railway classification operations by Mr. W. B. Wright of that company. Where multiple cars moved in interchange, 50 percent of the savings shown in the Wright study were included in API's analysis.

The use of the Wright study reflects relative efficiencies obtained through multiple-car as opposed to single-car movements. API contends that the concept that an increase in the number of cars in a cut switched is accompanied by a less than proportional increase in required switching time is one that has long been recognized. Because the Wright study reflects this principle, its applicability is superior to the substantial neglect of that principle inherent in the railroads' cost presentation.

API makes switching adjustments by applying the relationships taken from the Wright study. These adjustments are based on the number of cars per cut at origin and destination for each movement costed out by API. In addition API makes adjustments to freight car and station clerical costs. Adjustments to the freight car costs reflect the actual number of detention car-days reported to API by officials of member firms. Reductions were based on deviations in the actual number of car days from the assumed number of car days in Rail Form A.

Adjustments are also made to station clerical costs when multiple-car cuts were found. The method of making such adjustments is the same as that employed by the respondent railroads. This method assumes that 75 percent of station clerical expense per carload is associated with the car and 25 percent is associated with the shipment.

Using the adjustments made to switching expense, car-day expense, and station clerical expense mentioned above, API computes adjusted revenue-variable cost ratios for 15 selected movements of pulpwood, 5 in each territory. API presents these ratios and the ratios developed by the respondent railroads for the same 15 movements.

API's presentation of respondent railroads' ratios of revenue to variable cost for the 15 movements have a range from 64 percent to 98 percent. API's adjusted ratios for the same 15 movements range

356 I.C.C.

from a low of 101 percent to a high of 185 percent. This, states API, shows that when specific operating conditions of the movement of pulpwood traffic are taken into account, the losses implied in respondents' results do not exist. The ratios are above 100 percent for all 15 movements and are quite favorable in the South and West, where the ratios range from 129 to 185 percent with a median ratio of 157.5 percent.

C. Opposing shipper comments.—The National Association of Recycling Industries (NARI), groups the results of the respondent railroads and redisplay these results for each territory, weighting such results according to the carloads of each commodity taken from the 1974 DOT 1-percent waybill sample. NARI criticizes the railroads for merely presenting their results on a commodity basis, for not displaying weighted results for groups of virgin and recyclable commodities and comparing these results for recyclable commodities with their competing or potentially competitive virgin counterparts.

Without changing or adjusting the ratios of revenue to variable cost shown by the railroads, NARI weights those results by their mix in the 1-percent waybill sample. Those results are shown below:

Ratio of revenue to variable cost for paper (Percent)

Territory	Virgin	Recyclable
East	67.0	119.0
South	96.6	138.3
West	105.6	150.3

NARI's results show that in each territory the ratios of revenue to variable cost, when weighted approximately by the 1-percent waybill sample, are higher for the recyclable commodities.

In addition, NARI criticizes the cost presentation of the SFA as being deficient in the paper area because SFA failed to include any analysis of pulpwood chips along with their analysis of pulpwood.

Fort Howard concludes that the superior transportation characteristics of wastepaper traffic compared to that of its competing virgin commodities, pulpwood and woodchips, have not been manifested in the present rail rate structure. This present rate structure favors the movement of the virgin commodities.

356 I.C.C.

Fort Howard cites specific transportation characteristics which make the transportation of wastepaper favorable when compared to its competing virgin commodities.

1. *Freight revenue.*—The average freight revenue per carload, car-mile and ton-mile is higher for wastepaper than for pulpwood or woodchips.

2. *Length of haul.*—Wastepaper has an average haul of approximately 400 miles in comparison with a haul only slightly in excess of 100 miles for woodpulp and woodchips. Longer hauls usually produce a greater contribution to profit than short hauls.

3. *Car type.*—Wastepaper moves in general-service unequipped boxcars, while the virgin commodities require a specialized car. Because of greater utilization and its ability to be used in so many ways, boxcar operating costs are less than those of specialized cars.

4. *Paper mill reloading of wastepaper cars.*—Boxcars arriving at the mill loaded with wastepaper are reloaded with outbound shipments of paper products. This expeditious reloading has the effect of reducing switching costs because no empty car has to be returned to the classification yard nor must an empty car be transported later from a yard to the mill. In addition, line-haul costs are reduced because of this reduction in empty miles, hence a lower empty-return ratio can be used in the computation of costs.

Supporting shipper rebuttal.—API attempts to correct and adjust the ratio of revenue to variable cost of 67 percent for movements of pulpwood in the East as shown in the statement of witness Fauth for NARI. API's method is to restate revenue and variable cost for pulpwood in the official territory, as shown below.

1. *Revenue.*—API develops the revenue per carload for pulpwood in the official territory from the information presented in witness Fauth's statement. This information is the revenue taken from the 1974 DOT 1-percent waybill sample. Based on these revenues, API develops a carload revenue of \$358.30, which they contend is high. API subsequently checked the data published in the Carload Waybill Statistics⁹¹ to verify these results. This check shows a revenue of \$356 per car.

However, a check of the 1973 Waybill Study published by DOT shows a carload revenue of only \$159 for pulpwood in the East. API contends that ex parte increases granted between 1973 and 1974 would not account for the difference between the \$159 carload revenue shown for 1973 and the \$356 shown for 1974. As an

⁹¹U.S. Department of Transportation, *Carload Waybill Statistics Territorial Distribution Traffic and Revenue by Commodity Class*. Statement TD-1, year 1974.

alternative, API increases the carload revenue shown in the 1973 Waybill Study, \$159, by 16.57 percent to reflect rate increases granted in 1974. This results in a carload revenue of \$185.31.

2. *Variable costs.*—API maintains territorial average factors result in an overstatement of variable costs and an understatement of the ratio of revenue to variable costs.

API levels the same criticism in rebuttal as previously delineated.

API maintains that the adjustment of official territory average costs by use of detailed traffic and operating studies in the southeast is consistent with the ICC Cost Section's adjustment of iron ore and coal in the Burden Studies. The similarity in the rail handling of pulpwood in official territory is also confirmed by studies conducted by API for the Ex Parte No. 270 proceedings and from meetings with personnel of paper companies with mills in New England.

Based on the results of detailed analyses conducted in cooperation with the SFA territory carriers, API applied the relationship of special study data to the territorial average factors in official territory to estimate the variable cost per carload of handling pulpwood in official territory. The cost per carload developed by API is \$178.49.

3. *Revenue/cost relationships.*—API develops two revenue-variable cost ratios, shown below:

Item	Revenue per carload	Variable cost per carload	Ratio
			Percent
Revenue-NARI	\$358.30	\$178.49	201
Revenue-API	185.51	178.49	104

The first ratio, 201 percent, is based on the carload revenue developed from witness Fauth's statement. The second ratio, 104 percent, is based on the carload revenue developed by API in its statement using the revenue per carload from the 1973 waybill statistics updated to include ex parte increased granted in 1974.

API maintains that NARI ignores woodpulp (STCC 26 111) in their statements of record. Evidence submitted by the railroads show the following ratios of revenue to variable cost for woodpulp and paperwaste or scrap (STCC 40 24):

Commodity		Ratio of revenue to variable cost		
STCC	Description	West	South	West
		Percent	Percent	Percent
40 24	Paper, waste or scrap	119	138	156
26 111	Woodpulp	187	186	174

While the use of unadjusted costs by the railroads is not condoned or accepted by API, it was felt that the lack of adjustments for these two commodities is far less significant than in the case of pulpwood, previously cited. The unusual operating characteristics applicable to pulpwood movements are not prevalent in movements of wastepaper and woodpulp. For this reason API believes that the ratios shown above are a reasonable indication of the relationships between wastepaper and woodpulp.

Supplemental verified statement of NARI.—NARI presents a supplemental verified statement to refute the charges made by API. NARI disputes API's use of a carload revenue of \$358.30 for movements of pulpwood in the East, which API derived from witness Fauth's statement.

NARI contends that it did not independently develop the revenue per carload for pulpwood shipments in official territory for 1974. Rather, NARI used the average revenue per carload of \$163 developed by the eastern railroads in their testimony.

NARI undertakes to show that the carload revenue of \$358.30 used by API in the rebuttal statement is incorrect. NARI examined the 1975 Carload Waybill Statistics published by the Department of Transportation and found that the revenue per car was \$212 for movements of pulpwood in the official territory. As previously noted in API's rebuttal statement, the carload revenue for pulpwood in the official territory in the 1973 waybill study was \$159. Thus, NARI contends, the revenue per carload of \$358.30 derived from the 1974 study is obviously erroneous.

An inspection of a computer listing of the individual records for official to official movements of pulpwood in railroad-owned cars from the 1974 waybill sample showed an aberration in carloads originating and terminating on the Bangor and Aroostook Railroad Co. (BAR). The average carload revenue for 108 BAR carloads shown in this sample was \$965.26 per car and the average length of haul was only 85 miles.

The movements of pulpwood submitted by the eastern railroads in this proceeding which were selected by the BAR show an average revenue of only \$115.11, indicating that the results for the BAR movements in the 1974 waybill sample must be incorrect. NARI assumes that the error in the 1974 waybill statistics must be due to the fact that the decimal point was placed too far to the right. Based on this assumption, NARI indicates that the average carload revenue for the BAR movements in the 1974 1-percent waybill study should be \$96.53 rather than \$965.26.

NARI combines this carload revenue for the BAR movements with the carload revenue totals for the other movements of pulpwood in the East to arrive at a weighted average carload revenue of \$157.77. This carload revenue total is very close to the carload revenue of \$163 shown by the eastern railroads in their opening statement.

NARI proceeds to develop two ratios of revenue-to-variable cost for movements of pulpwood in the official territory. For each ratio NARI uses the carload revenue of \$157.77 developed in the manner indicated above. For the first ratio, NARI uses the variable cost per carload of \$178.49 developed by API in its rebuttal statement. NARI states that even using API's costs the ratio of revenue to variable cost is 88 percent ($\$157.77 \div \178.49).

NARI develops a second ratio using the average variable cost per carload of \$242 shown by the eastern railroads. This ratio is 65 percent ($\$157.77 \div \242).

Discussion and conclusions relative to opposing and supporting shipper comments

a. *API's criticism of respondents' results.*—API criticizes the cost presentations of the respondent railroads on many points. With regard to those criticism, the following comments apply:

1. *Intrastate movements.*—API questions the inclusion of intrastate movements in the submissions of the respondent railroads, and shows that the ratios of revenue to variable cost are generally higher for interstate movements of pulpwood than for intrastate movements.

API's allegation that the inclusion of intrastate movements is questionable has merit. However, the disparity between the ratios of revenue to variable cost for inter- and intrastate movements is not an issue since intrastate movements have not been considered in this proceeding.

2. *Rail Form A costs in official territory.*—API criticizes the use of costs in the official territory because such costs are heavily weighted by the results of the Penn Central.

It is true that such costs are weighted heavily by the expenses of the Penn Central. However, it should be noted that a large percentage of the subject movements move on the Penn Central. In the absence of more specific costs i.e. individual railroad Rail Form A costs, or results of special studies, territorial costs are the best approximations available.

3. *Car age and capacity.*—API maintains that some pulpwood traffic of the Maine Central and the Bangor and Aroostook Railroads moves in old, structurally deficit cars. This, states API, results in lower revenues because of the light-loading capabilities of these cars and also results in higher costs because average depreciation is charged to these movements in Rail Form A while it is obvious that these cars incur little or no depreciation expense.

API's criticism is faulty and irrelevant for the following reasons:

a. Lower revenues do not necessarily mean lower revenue-variable-cost ratios. Thus, while the revenue per car may be lower than average for movements of pulpwood, the cost per car may be correspondingly lower.

b. API does not introduce specific evidence to shown the extent to which these cars are in use. API fails to show whether the overall proportion of traffic moved in such old, structurally deficient cars is very small or approaches a majority of the movements of pulpwood in Maine.

c. Since the vast majority of pulpwood traffic in Maine is intrastate, any such overstatement of costs would not be present in the Commission's results.

4. *Multiple-car cuts and reduced car detention time.*—API maintains that the data for the eastern railroads' submission on pulpwood is deficient due to the fact that such savings as reduced car detention time are not considered. In addition, API criticizes all three respondents for not properly considering the economies involved in pulpwood traffic due to the existence of multiple-car cuts.

API shows that for five selected destinations in the East, the average number of cars per cut ranges from 3.4 to 13.1 cars.

While the average number of cars per cut at either origin or destination cannot be determined from Rail Form A, the switching cost per carload derived from Rail Form A is an average cost which reflects all switching including cars switched in multiple car cuts.

API has failed to demonstrate that the number of cars per cut at either origins or destinations of pulpwood movements substantially exceeds the average number of cars per cut for all movements in the

East. It is further noted that the average number of cars per cut of 13.1 shown at Millinocket, Maine, would be principally for terminations of intrastate movements. To the extent that the traffic and movements taken under consideration by API is intrastate traffic, it is not relevant to this proceeding.

b. *API's costing of selected movements.*—API costed out 15 pulpwood movements and compared the ratios of revenue to variable cost derived by API to those shown by the respondent railroads for these movements. The ratios shown by API are significantly higher than those shown by respondents.

With regard to API's derivation of these 15 ratios of revenue to variable cost for those selected movements, the following comments apply:

1. API has not shown that the 15 movements selected are representative of pulpwood traffic in each territory.

2. Ten of the 15 movements chosen by API are intrastate movements in spite of the fact that API questions the relevancy of inclusion of intrastate movements in respondents' submissions.

3. API has incorrectly applied the Wright study to determine the reductions in switching. The Wright study shows reductions based on an average of 2.91 cars per cut, while API makes reductions to switching costs based on an assumption of one car per cut. For example, for the movement of pulpwood from Olympia, Ky., to Covington, Va., API includes only 39.43 percent of regional average switching expense per carload based on the assumption that on the average three cars per cut are switched at origin and destination.

However, if the Wright study were applied correctly by API, approximately 97 percent of the territorial average switching cost would be applied to this movement. Thus, even if we assume the validity of the Wright study, the reductions in switching costs are overstated.

4. The Wright study has not been supported on the record in this proceeding.

For the reasons stated above, API's costing of selected pulpwood movements has little value.

c. *SPTC/SFA joint study on pulpwood and woodchips.*—API has presented the results of a joint study on pulpwood and woodchips in the South. This study is the joint effort of SPTC and SFA and shows ratios of revenue to variable cost of 113 percent for pulpwood and 107 percent for woodchips in the South.

API uses the results of this study to adjust regional average costs, such as switching cost per carload, in its presentations. API uses the

traffic and operating characteristics from that study to unjust respondents' costs, resulting in a ratio of revenue to variable cost of 114 percent for movements of pulpwood in the South.

In addition, API maintains that the percentage reductions to regional costs shown in the joint study are applicable to other territories and applies these reductions to pulpwood movements in the East.

Because API has submitted only the final results of the joint study on pulpwood and woodchips in the South, the study has not been supported on the record. However, due to the lack of opposition or protest to API's use of the factors from this study and due to the fact that the study was a joint effort on the part of shippers and railroads, the results may be considered reasonable.

d. *Revenue per car for pulpwood in the East.*—API questions the results of the 1974 DOT 1-percent waybill sample for pulpwood in the East, maintaining that the carload revenue total of \$358.30 is too high.

NARI agrees, in its rebuttal, that this total appears to be in error. However, NARI is correct in stating that it used the 1974 waybill sample *only* for car volumes to give weight to the ratios shown by respondents. Thus, while the carload revenue from the 1974 waybill sample does appear high and in all probability is in error, it is not relevant to this proceeding as neither NARI nor respondents used this total to develop revenue-cost ratios for pulpwood in the East. Similarly, API's ratio of revenue to variable cost of 201 percent for movements of pulpwood in the East, is highly questionable because the revenue per carload is based on this total.

2. *Discussion relative to NARI's comments.*—NARI attempts to redisplay the results of the respondent railroads, using the relative weights of each commodity from the 1974 DOT 1-percent waybill sample.

While agreeing that weighting of the cost data for two or more commodities for comparative purposes has merit, the method used by NARI is suspect. The data of record is not the result of a statistical sample. There is no basis for assuming that the same consist of traffic movements exists in the data of record as in the 1-percent waybill sample. In the absence of more complete data weighting cannot be performed properly.

3. *Discussion relative to Fort Howard's comments.*—Fort Howard emphasizes the favorable transportation characteristics of wastepaper. The following comments are offered relative to these characteristics:

1. *Freight revenue.*—Fort Howard asserts that revenue per carload, per car-mile and ton-mile is higher for wastepaper than for pulpwood or woodchips. Carload revenue, revenue per car-mile and revenue per ton-mile are not the most relevant statistics in conducting an analysis of the rate structure of wastepaper or any other commodity. While the revenue per car or per car-mile or ton-mile for wastepaper may in fact be higher than for woodpulp or woodchips, equal consideration must be given to the cost per carload, cost per car-mile, and cost per ton-mile. The measure of the profitability of this is the revenue-cost ratio. Higher revenue figures per se do not mean or imply higher profitability. The revenue-cost ratio is an applicable statistics to make determinations of profitability or contribution to overhead.

2. *Length of haul.*—Fort Howard alleges that because the average length of haul for wastepaper is greater than that of its competing virgin commodities, and longer hauls generally produce a greater contribution to profit, wastepaper traffic produces a greater contribution to profit. It may be true that the length of haul is greater for wastepaper. However, it is not necessarily true that longer hauls produce relatively greater contribution.

3. *Car type.*—Fort Howard asserts that because wastepaper moves in general-service unequipped boxcars while its competing virgin commodities require specialized cars, the costs are lower for the movement of wastepaper because of the higher utilization of general-service boxcars.

This assertion is true. This is reflected in the Commission's calculations, based on regional costs. Regional costs reflect that 20 percent of the inbound boxcars are reloaded at that site for an outbound shipment. Use of this 20-percent reload factor produces lower terminal costs. A Commission study shows that the empty-return ratio is lower for boxcars than for other car types, reflecting the potential diverse utilization of a boxcar. Fort Howard has failed to present evidence to substantiate a reload factor in excess of 20 percent.

4. *Papermill reloading of cars.*—Fort Howard asserts that virtually all inbound cars of wastepaper can be reloaded at the paper mill site. While this may be, Fort Howard presents no evidence to show what percentage of inbound cars are in fact reloaded.

356 I.C.C.

TABLE 80B

*Commission's adjustment of respondents' revenue-variable-cost ratios*AVERAGE RATIO OF REVENUE TO VARIABLE COST (PERCENT)¹

STCC Virgin commodities	East		South		West	
	Ratio	Number of move-ments	Ratio	Number of move-ments	Ratio	Number of move-ments
24 114 10 - Pulpwood or pulpwood logs.....	85	5	90	139	123	43
24 115 - Wood chips.....	83	9	.....	0	106	23
26 111 - Pulp.....	186	35	187	126	185	33
<i>Recyclable commodities</i>						
40 24 - Paper waste or scrap.....	120	22	169	8	149	31
<i>Virgin commodities</i>						
Overall weighted average ratio	130	49	108	265	132	99

¹Based on interstate movements only.

The overall weighted average ratio by region was computed for the three virgin commodities. This was done due to the wide range of ratios in each region as can be seen in the table above. This overall weighted average ratio was computed by weighting each ratio for the individual commodities by the total estimated annual tonnage for the movements of that commodity.

Comparison of Commission's revenue-variable cost ratios

2. *Paperwaste (40 24) vs. pulpwood logs (24 114 10), woodchips (24 115) and pulp (26 111).*—The overall weighted average ratio for the virgin commodities is 130 percent in the East, which is slightly higher than the 120 percent ratio for the recyclable commodity, paperwaste.

The ratio for the recyclable commodity is slightly higher than the overall weighted average ratio for the virgin commodities in the West (149 vs. 132 percent) and significantly higher in the South (169 vs. 108 percent).

Comparison of Commission's results with respondents' results.—There are two major differences in the results shown:

1. Respondents' results include no movements of woodchips (24 115) in the West. The Commission's results for woodchips in the 356 I.C.C.

West are based on 23 movements. These movements were submitted as evidence by the western railroads but were not costed out and presented in the statement of witness Harity of the western railroads.

2. In the East, Commission's and respondents' ratios for the three virgin commodities are similar. However, in computing an overall weighted average ratio for the three commodities, a major difference exists. The overall weighted average ratio for the virgin commodities in the East is 71 percent based on the respondents' result and 130 percent in the Commission's results. This difference produces different comparisons.

The overall weighted average ratio of 71 percent for the virgin commodities in the East is very heavily weighted by the ratios for pulpwood logs and woodchips. On the other hand, the overall weighted average ratio of 130 percent for the virgin commodities in the East in the Commission's results is not weighted nearly so heavily by the results for pulpwood logs or woodchips. This is due to the fact that the majority of the movements of pulpwood logs (24 114 10) and woodchips (24 115) are intrastate movements and are not included in the Commission's results. For example, the respondents' results for pulpwood logs are based on 66 movements. The Commission's results for pulpwood logs are based on only 5 movements. Similarly, while the number of movements of woodchips submitted by the eastern railroads is 21, our results are based on only 9. On the other hand, only a small percentage of pulp movements are intrastate movements. The number of movements of pulp submitted by the eastern railroads is 42 and the number of movements we utilized is 35, a reduction of approximately 17 percent.

The disparity discussed above does not occur in either the South or West, even though in the South there is a drastic difference in the number of movements of pulpwood logs (24 114 10). The respondents' results for that commodity which include intrastate movements are based on a total of 390 movements, while the Commission's results are based on 139 movements.

In summary the following table best illustrates the comparison between revenue to variable cost ratios for virgin commodities and recyclable commodities.

356 I.C.C.

TABLE 80C

Average ratios of revenue to variable cost (percent)

	East		South		West	
	Respond- ents	Com- mission	Respond- ents	Com- mission	Respond- ents	Com- mission
<i>Virgin</i>						
24 114 10 - Pulpwood or pulpwood logs	67	85	97	90	103	123
24 115 - Woodchips	61	83	---	---	---	106
26 111 - Pulp	187	186	186	187	171	185
<i>Recyclable</i>						
<i>Virgin</i>						
24 114 10 - Pulpwood or pulpwood logs	67	85	97	90	103	123
24 115 - Woodchips	61	83	-----	-----	-----	106
26 111 - Pulp	187	186	186	187	171	185
<i>Recyclable</i>						
40 24 - Paperwaste or scrap	124	120	138	169	148	149

TEXTILE WASTE

Because they have different STCC numbers, the commodities under the general heading "Textile Waste" are listed at the beginning and end of table 1. Together these commodities, along with the virgin natural resource materials with whom they potentially compete, are as follows:

356 I.C.C.

STCC No.	Recyclable or re-cycled material	STCC No.	Virgin natural resource material
22 941	Textile waste garnetted or processed	24 114 10	Pulpwood or pulpwood logs
22 973 15	Noils, ramie	26 111	Pulp
22 973 25	Noils (combining or comber waste), cotton	22 999 26	Cotton linters, bleached or dyed
22 973 68	Rovings, jute andistle (axle)	22 977	Wool or mohair, combed or scoured
22 994	Packing or wiping cloths or rags (processed textile wastes)	22 992	Jute goods, exc. bags
		22 995	Vegetable fibers, exc. cotton
		28 213	Synthetic fibers, exc. glass
		22 119 74	Cotton piece goods
40 22	Textile waste, scrap or sweepings	26 111	Pulp
		26 111 40	Cotton linters pulp
		26 111	Pulp

356 I.C.C.

The respondent railroads submitted repetitive movements for these commodities. The ratios of revenue to variable cost arrived at by respondents and our adjusted ratios of revenue to variable cost are displayed in the following tables.

TABLE 81

*Respondents' average ratio of revenue
to variable cost¹*

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
26 111 40 - Cotton linters pulp	179	7	119	2	262	7
26 111 - Pulp	189	42	186	146	171	40
22 119 74 - Cotton piece goods	111	3	172	1	---	0
22 971 - Wool or mohair	---	0	---	0	506	2
22 992 - Jute goods, excl. bags	224	6	138	2	211	6
22 995 - Vegetable fibers	218	17	219	1	313	4
28 213 - Synthetic fibers	139	25	134	26	199	19
22 999 26 - Cotton linters, bleached or dyed	---	0	184	1	---	0
24 114 10 - Pulpwood or pulpwood logs	67	66	97	390	103	34
24 115 - Woodchips	61	21	---	0	---	0
Recyclable commodities						
40 22 - Textile waste	125	24	109	29	144	27
22 994 - Packing or wiping cloths or rags	147	3	197	1	158	12
22 973 25 - Noils, cotton	---	0	103	4	145	1
22 973 15 - Noils, ramie	---	0	---	0	---	0
22 941 - Textile waste garnetted or processed	128	3	---	0	180	5

¹Averages reflect weighted average ratio of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harnity of Western Railroad Association.

356 I.C.C.

TABLE 82

*Commission's adjustment of respondents' revenue-
variable-cost ratios*

AVERAGE RATIO OF REVENUE TO VARIABLE COST (PERCENT)¹

STCC Virgin commodities	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
26 111 40 - Cotton linters pulp	187	8	148	5	162	3
26 111 - Pulp	186	35	187	126	185	33
22 119 74 - Cotton piece goods	99	3	173	1	---	0
22 971 - Wool or mohair	---	0	---	0	474	2
22 992 - Jute goods, excl. bags	181	4	165	2	202	5
22 995 - Vegetable fibers	212	16	189	1	284	4
28 213 - Synthetic fibers	138	27	126	25	200	13
22 999 26 - Cotton linters, bleached or dyed	---	0	171	1	---	0
24 114 10 - Pulpwood or pulpwood logs	85	5	90	139	123	43
24 115 - Woodchips	83	9	---	0	106	23
<i>Recyclable commodities</i>						
40 22 - Textile waste	114	24	108	25	141	24
22 994 - Packing or wiping cloths or rags	137	3	151	2	157	10
22 973 25 - Nails, cotton	---	0	117	3	---	0
22 973 15 - Nails, ramie	---	0	---	0	---	0
22 941 - Textile waste, garnetted or processed	116	3	---	0	172	4

¹Based on interstate movements only

"Textile waste" generally means all textile fiber-products, including rags and clippings, which are produced by textile mills during the processing and/or manufacturing of yarns, fabrics, and other textile products. According to Gellman, there are three basic types of textile waste—cotton, wool and synthetics and blends. The following is Gellman's description of these categories of textile waste and the conditions affecting their use.

Cotton-based textile wastes account for the vast majority of recycled materials. They take the form of cuttings from garment manufacturers, textile mills, used clothing centers (e. g., Salvation

356 I.C.C.

Army) or cotton milling. They can be used as industrial rags, pulp for paper, vulcanized fibers, batting, upholstery materials, flock and filler, and roofing and floor materials.

Gellman states that the demand for cotton textile wastes are in a state of decline because of a problem with purity.

Increased proliferation of textile blends has reduced the availability of pure cotton rag waste ***. Because of contamination with synthetic fibers, a number of mills have changed to other sources of fibers such as cotton linters. As the trend toward fiber blends continues, the markets for pure cotton waste will dwindle along with supply.

Paper mills have a strong incentive to shift to virgin materials such as cotton linters and to avoid the risks and extremely costly danger of contamination.

Contamination is also a problem in the use of cotton waste products in vulcanized fibers. In addition the vulcanized fiber industry is slowly being crowded out by emerging new competitive products such as synthetic polymers. The technical preference for virgin substitutes is evident in the use of cotton waste in flock and filler.

Applications using precision-cut (virgin) flock have been increasing rapidly. At the same time, several of the large markets for random cut fillers have been lost because of modern technological developments.

According to Gellman, cotton waste is losing another segment of its market; the batting, padding and upholstery filler textiles. For a variety of reasons, such as lower labor costs and being easier to shape, polyurethane foam is replacing cotton waste.

Gellman submits that the above discussion shows that the demand for cotton waste products has eroded because of new technologies which have produced superior substitutes and not because of railroad rates. Also, the use of secondary textiles has been impeded by export barriers. Also the decline in demand for cotton waste has caused a decline in its price. In the period April 3, 1965 to April 2, 1966, the observed prices ranged from 8.03 cents per pound to 8.98 cents per pound. Four years later, the range had fallen from 5.27 cents to 5.44 cents per pound. It was during this time that contamination first became a serious problem.

Turning next to wool waste, Gellman states that it is dissimilar to cotton waste for several reasons. First, any reprocessed wool is made into new yarn which, in turn, is used in new garments or rugs. The quality of the reprocessed wool is only slightly diminished from its

356 I.C.C.

original quality. Second, the other major form of wool "recycling" is through sale of reuseable clothing.

Gellman states that demand for wool is basically inelastic because it can only be used in a limited number of ways. From a purely technical viewpoint, reprocessed wool is an excellent substitute for virgin wool. However, the substitutability of virgin wool is severely constrained by the Wool Labeling Act of 1939. This law requires that only virgin wool products can be labeled as such, thereby psychologically stigmatizing any garment manufactured from processed wool. What little demand there is for reprocessed wool, therefore, lies in the areas where the psychological stigma does not apply, for instance, some types of carpeting. Gellman states that to the extent that reprocessed wool is available at low costs for those purposes, then any supplies will be recycled. Wool waste also faces another governmental barrier in the refusal of foreign governments to import used American woolen clothing in order to protect and stimulate domestic industries.

Besides the above constraints, Gellman states that the demand for domestic reprocessed wool is further inhibited by the fact that the major share of this secondary material used in the American economy is supplied from foreign countries, especially Italy. Gellman submits that this and the Wool Labeling Act are what influence the movement of wool waste and not transportation rates. If secondary wool can be reprocessed in Italy and transported to the United States and still be competitive then domestic transportation costs are not the barrier preventing American firms from entering or expanding domestic business.

Synthetic fibers is the sector of the textile industry which is experiencing massive growth. The absolute levels of usage of wool and cotton have been basically unchanged in the last 15 years; synthetics, therefore, have accounted for all the increases in total textile usage. The synthetic fibers come in numerous forms due to the multiplicity of weaves and chemical compositions. Of significance to the recycling industry is whether or not the synthetic fiber makes up 100 percent of the textile (pure) or is interwoven with some other fiber. As was pointed out in the discussion of cotton above, synthetics are essentially regarded as a contaminant of natural fibers, at least insofar as the recycling of the natural fibers is concerned.

There are only a very limited number of uses of synthetic waste fibers. Some of the reuseable synthetic fibers come directly from

their chemical manufacturers as "synthetic fiber waste" which is sold to the garnetting industry, where it is processed into yarn suitable for spinning, weaving, or kitting. Thus, in a chemical pure form (direct from the chemical manufacturer) there are uses for some synthetics. Only two to three percent of the output generated by the chemical companies is waste, most of which is already reused. Weaving, finishing, and fabrication stages in the production process are the largest generators of wastes. From these stages, the reuses are extremely limited. The principal use is in roofing, but this market is grossly over-supplied. Furthermore, there are indications of technical inadequacies of synthetics as components in roofing and flooring materials because they cause weak spots. Indeed, some plants have purposely shifted to pure natural fibers for use in roofing and flooring manufacturing.

For use as batting, padding, and upholstery materials, the synthetics are feasible fibers, but even here polyurethane has emerged as superior.

In essence, the market for recyclable synthetic fibers is price inelastic. That is to say, little impact on demand will result from adjustments in price levels. The few technologically acceptable uses of synthetic fibers that have been found are already fully utilized. If any new consumption is to be stimulated, the solutions will come from technological innovations designed to use these presently worthless byproducts.

Without technological change only one possible avenue exists for any increase in recycling of this material—barriers imposed by foreign governments must be removed in order to make feasible the increased exportation of clothing made out of pure and blended synthetic fibers. Presently, sales of used clothing to underdeveloped countries are impeded by protective trade tariffs. Other than the removal of these foreign-imposed regulations, Gellman states, demand is, for all intents and purposes, inelastic.

While there are problems affecting the demand for synthetics, there is also a problem with respect to their supply. The problem, is the absence of the mechanical technological ability to separate the desired fibers from other components of the blend. Thus, even if a great demand did exist, there would be problems in supplying enough synthetics to meet that demand.⁹²

Because of the demand and supply problems with synthetics and blends, Gellman contends that transportation rates will produce

⁹²This problem applies to cotton waste as well, for cotton wastes and synthetics are contaminating each other and the only existing method of separating one from the other is manual separation.

little, if any, increase in their use. Any decrease in railroad rates will have an imperceptible effect upon the recycling of synthetic textiles.

In reply to Gellman and on behalf of the shippers of Textile Fibers and By-products Association (TF&BPA), A. Sheftel and Sons, Inc., and Frankel Brothers & Co., Inc. The statements of A. Sheftel and Sons and Frankel Brothers were part of the submissions by NARI.

TF&BPA is composed of 88 firms engaged in the purchasing, processing, and marketing of textile wastes. They handle the majority of textile waste produced in this country.

TF&BPA states that prior to World War II, the entire movement of textile waste was transported by the railroads. Thereafter, and today, there is an increasing trend toward private trucking and, in addition, an important segment of textile waste materials is transported by for-hire motor carriers. TF&BPA attributes this to the development of the modern highways and expressways, rail general rate increases, competitive motor carrier rates (which in backhaul situations are lower), and poorer rail service (longer delivery time and shortages of boxcars).

With respect to the value or selling price of textile waste, TF&BPA states that in 1966 the value of spinnable cotton waste ranged from 10 cents per pound up to 18 cents per pound, depending on the grade or quality and the condition of the market on any given day. The values of the lower grades of textile waste, ranged in 1966 from 1 cent per pound up to 6 cents per pound and in 1976 from 1/2 cent per pound up to 9 cents per pound, also depending on the grade or quality and the market at the time.

TF&BPA takes issue with parts of the testimony by Gellman. First, it argues that with 25 to 35 percent of its sale value represented by transportation costs, textile wastes are indeed very sensitive to any increase in those costs. Secondly, with respect to Gellman's comments on the batting, padding and upholstery filler trade, TF&BPA states that while it is true that polyurethane foam has made some encroachment on these uses, cotton waste products and even mixtures of cotton/synthetic waste products are beginning to recapture some of the markets that were lost due to government regulations on flammability. Cotton batting can now be treated inexpensively to meet flammability regulations now in effect and some that are expected in the future. Polyurethane foam has been able to meet these regulations but it is more expensive than cotton batting, even in treated form. Consequently, the prospects for

356 I.C.C.

increasing usage in these fields is optimistic. In addition to this, technology has developed new types of bonded padding which in the last year or so has made tremendous inroads on polyurethane foam and other types of pads. A large percentage of the raw material utilized in making these bonded pads is recycled clippings which are combinations of cotton and synthetic.

TF&BPA asserts that price is very important in the choice between textile waste and polyurethane foam and the trend back towards cotton waste products or cotton batting is due to price. Some of the ingredients in producing polyurethane are directly related to crude oil whose price, it is well-known, has advanced significantly.

Thirdly, TF&BPA challenges Gellman's assertion that there are only a limited number of uses of synthetic fibers. It states that when pure, such as 100-percent nylon and 100-percent polyester, they can be carded and spun into substandard yarn which can be utilized for various purposes. They can also be used for making high quality quilting products, pillow products and batting. Generally, most pure synthetic fibers in waste form can be used for practically the same purposes as the virgin fiber but probably would produce products of a substandard nature.

Throughout its statement TF&BPA stresses the low value of the majority of textile wastes, the great portion of transportation costs to sale price, and the environmental merits in its recycling.

A. Sheftel & Sons, is a major processor of textile waste with a plant in Allentown, Pa., and a wholly owned subsidiary in Greenville, S.C. Its primary markets are high-grade papermill manufacturers, fiber mills and wiping cloth manufacturers. It exports approximately 60 percent of its total volume to foreign countries where it is used primarily in garnetting and respinning into a new yarn.

Historically, textile waste shipments move under minimum carload rates of 30,000- to 50,000-pounds per carload. Today because of the development of high density balers,⁹¹ A. Sheftel & Sons have the capability to load 80,000, and in some cases, even 100,000 pounds of baled waste into a 50-foot railcar. It urges that the current minimum rates be maintained and that incentive rates of 60,000 and 70,000 pounds be established. Although some of its customers have problems handling and storing larger quantities, it states that these incentive rates will spur it to encourage its

⁹¹The finished product of textile waste processors such as A. Sheftel & Sons, is a bale of textile waste that ranges in weight from 900 to 1,500 pounds.

customers to accept heavier cars and, thereby induce the movement of low-valued textile waste.

Frankel Brothers, which grades, packs, sorts and bales various types of textile wastes, also suggest the establishment of rates on the basis of heavier loading and in conjunction with trade practices and capacities.

In this regard, the southern railroad respondents point out that in their territory, although the general scale is based upon 30,000- and 40,000-pound minima, there are also heavy-loading scale rates on synthetic fiber waste (the lowest grade of textile waste) of 60,000 and 100,000 pounds.

We have stated that trends in traffic tonnage give an indication of the effect of rail rates on the movement of a commodity. For the various types of textile waste, data (Freight Commodity Statistics) were submitted for only the major grouping of textile waste, STCC No. 40 22, "Textile waste, scrap or sweepings." The following tables show a decreasing trend in official territory and fluctuating volumes in southern and western territories.

TABLE 83

Official territory

STCC NO. 40 22—TEXTILE WASTE, SCRAP, OR SWEEPINGS

	Tons originated	Gross freight revenue
1966.....	388,087	5,095,315
1967.....	388,893	4,753,122
1968.....	335,474	4,981,754
1969.....	308,574	4,686,048
1970.....	251,261	4,368,574
1971.....	232,314	4,545,746
1972.....	229,327	4,856,978
1973.....	236,163	5,045,000
1974.....	193,061	4,863,000

356 I.C.C.

TABLE 84

Statement comparing total revenue per ton originated—textile waste or scrap, STCC 40 22, and all traffic except that commodity, southern district, 1964-1975

(1967 = 100)

Year	Textile waste or scrap			All traffic except textile waste or scrap		
	Tons originated	Total revenue	Revenue per ton	Tons originated	Total revenue	Revenue per ton
1964.....	403,856	\$3,600,548	\$8.92	285,126,702	\$1,337,514,874	\$4.69
1965.....	412,657	3,681,595	8.92	296,816,129	1,397,177,974	4.71
1966.....	451,935	3,943,925	8.73	312,798,805	1,481,748,969	4.74
1967.....	459,947	3,926,919	8.54	328,211,153	1,513,231,182	4.61
1968.....	483,368	4,329,601	8.96	329,573,907	1,625,898,030	4.93
1969.....	489,154	4,473,218	9.14	340,094,873	1,780,939,566	5.24
1970.....	445,659	4,433,775	9.95	350,570,931	1,931,847,318	5.51
1971.....	428,164	4,772,385	11.15	347,668,234	2,119,697,907	6.10
1972.....	471,219	5,164,123	10.96	366,901,685	2,273,864,323	6.20
1973.....	484,002	5,147,000	10.63	379,734,209	2,476,345,000	6.52
1974.....	472,747	5,391,000	11.40	387,061,778	2,847,793,000	7.36
1975.....	408,652	5,100,696	12.48	352,693,320	2,714,533,572	7.70

SOURCE: ICC Freight Commodity Statistics.

356 I.C.C.

TABLE 85

Western territory

STCC NO. 40 22- TEXTILE WASTE, SCRAP, OR SWEEPINGS

	Tons originated	Gross freight revenue
1970.....	103,362	\$ 2,346,548
1971.....	98,234	2,579,930
1972.....	95,671	2,704,759
1973.....	117,385	3,036,000
1974.....	123,564	3,345,499
1975.....	119,384	3,810,583

Discussion and conclusion.— Although we have included in table I the various types of textile wastes and specific movements and ratios have been submitted for them, the record on textile waste lends itself to a general or group consideration and not by specific commodity.

It can be seen in the table at the beginning of this section which show our ratios of revenue to variable cost that, generally speaking, the ratios for the virgin commodities are higher than those for the various types of textile waste. The ratios for the virgin commodities are in the 140 to 200 and above range. The recyclable wastes are generally in the 115 to 160 range.

The record indicates that competitive relationships may exist between the various textiles wastes and virgin commodities. However, because the ratios on the virgin commodities are higher, and due to the many other influences on the demand and supply of the textile wastes, the textile wastes do not appear to be suffering from a discriminatory rate structure. In the instance of cotton waste, for example, the record shows that one of its major uses is in the making of high-grade paper. It is the testimony of Gellman, that cotton waste is being replaced by cotton linters.¹ A comparison of the ratios for STCC No. 40 22 "Textile waste, scrap or sweepings" and STCC No. 26 111 40, "Cotton linters pulp," show that the ratios for the virgin cotton linters are higher in each of the three

¹In the preceeding section on pulpwood, woodchips, woodpulp, and wastepaper, we found the relationship between these commodities to be complementary and not competitive. Pulpwood, woodchips, and woodpulp have been listed as potentially competitive with textile waste. The record is explicit as to a competitive relationship only between textile waste and cotton linters, and thus it must be assumed that the relationship between pulpwood, woodchips, and woodpulp, and textile waste is also complementary.

territories. In the East it is 187 for cotton linters, and 114 for textile waste; in the South it is 148 for cotton linters and 108 for textile waste; and in the West it is 162 for cotton linters and 141 for textile waste. Even if the difference in ratios was not in favor of cotton waste, it does not appear that rail freight rates would be affecting its movement for, like synthetics, the problem of contamination acts as the major inhibitor to its demand and, therefore, transportation.

The problems textile wastes have with contamination, superior substitutes, Government regulations, and foreign competition coupled with the relatively low ratios it enjoys causes us to conclude that the rate structures on these commodities are just, reasonable and not unjustly discriminatory.

The fact that more and more textile waste is moving by motor carrier is attributable, according to TF&BPA itself, to more than just rail rates. The development of the highway system and quicker delivery times are inherent qualities of motor carriage which probably would not be offset by a reduction in rail rates.

With respect to the request for 60,000- and 70,000-pound incentive rates, we think that if such rates are warranted and justified by the ability to load heavier, they can be established through negotiation between shippers and carriers or rate bureaus. The record herein is clearly inadequate to prescribe the requested rates. However, if shipper-carrier negotiations fail, and upon a more extensive and specific record, we will consider the prescription of such rates.

As can be seen from the table displaying the Commission's adjusted ratios of revenue to variable cost, there are certain textile wastes for which there are no ratios. For other commodities in this investigation where there have been no ratios or insufficient evidence on which to base a decision, we are ordering further investigation. However, here we have considered textile waste as a general category and have seen general circumstances which indicate that rail rates are not impeding its movement. We have also seen that the virgin commodities have higher ratios than the textile wastes. There is only one ratio for STCC No. 22 973 15, "Noils, ramie" and STCC No. 22 973 25, "Noils (combing or comber waste)," cotton through STCC No. 22 973 68, "Rovings, jute and istle (ixtle)," 117 for STCC No. 22 973 25 in the South. Matching the ratios of these commodities with their potentially competitive virgin commodities as aligned in table I shows that the high range of virgin commodities alluded to earlier exists there also. So despite the absence of ratios, there is a strong inference that the rate structures on these commodities are just, reasonable and

nondiscriminatory. On this basis we will so conclude and no further investigation shall be ordered.

Our finding that factors other than rail rates constrain the recycling of textile wastes is in harmony with the analysis in our final environmental impact statement. Thus, no environmental impacts will result by our decision herein.

A final note, in this section we have relied heavily on the testimony of Gellman. The nature of this testimony was a description of the types of textiles wastes and a discussion of the factors affecting its demand and consumption. The reliance on this evidence is not inconsistent with our earlier finding that Gellman's study has certain deficiencies because those deficiencies relate to its econometric analysis and its derived rail transport demand elasticity; not its general view of a segment of the recycling industry. Due to the lack of consistent data on the production, transportation and sales of textile waste, Gellman did no attempt to determine its derived rail transport demand elasticity.

INDUSTRIAL SAND AND CULLET

(STCC NOS. 14 413 10 AND 32 299 24)

The following is a discussion of the virgin materials industrial sand and the potentially competitive recyclable material cullet. First we will discuss the collection, processing, and markets for these materials.

*Glass manufacturing.*⁹⁵—Industrial sand, (glass sand), unground can be used for a number of purposes, however, the greatest use of this commodity is in the manufacture of glass. In 1973, approximately 10,158,000 short tons of industrial sand were used by the glass industry.⁹⁶ This is compared to 7 million short tons consumed by the molding industry—the next largest user, other major uses being grinding and polishing, blast sand, fire or furnace, engine, and filtration. In 1973, a total of 983,629,000 short tons of industrial sand ground and unground was consumed. This is compared to 350,000 tons of cullet which was recycled in 1973.

⁹⁵The discussion of glass manufacturing and the utilization of cullet is based on information from the "Bureau of Mines Research Programs on Recycling and Disposal of Mineral-Metal, and Energy-Based Wastes," Information Circular 8595 (1973); "Economic Study of Salvage Markets for Commodities Entering the Solid Waste Stream" prepared for the U.S. Department of Health, Education and Welfare, Public Health Service, Environmental Health Service, Environmental Control Administration and Bureau of Solid Waste Management, by the Midwest Research Institute (1970) (MRI Report); *Encyclopedia Americana*, Vol. 12 (1976); Final Environmental Impact Statements in Ex Parte No. 219 and Ex Parte No. 295 (Sub-No. 1), *Increased Freight Rates and Charges, 1973-Recyclable Materials* (FEIS Ex Parte No. 295), Shreve, N., *Chemical Process Industries*, (3rd Ed. 1967); and the submissions of the parties.

⁹⁶*Minerals Yearbook, 1973, supra*, p. 1098.

The glass container industry is composed of 120 plants well distributed throughout 27 States with a concentration of plants in California, Pennsylvania, Illinois, New Jersey, and Indiana. The industry consists of three segments which produce containers, flat glass, and pressed and blown glass. In 1972, glass container manufacturers produced about 11.6 million tons of glass, or about 73 percent of the industry total. Producers of flat and pressed/blown glass turned out about 4.4 million tons, or about 27 percent of the total industry output.⁹⁷ Glass manufacturing is generally a one-step process starting with the raw material and making a finished product at the same location.

The basic ingredients of glass have always been essentially the same. Clear bottle glass is made by melting almost pure silica sand in furnaces at 2,700 degrees Fahrenheit. Burnt lime or limestone and soda ash are added to give the glass hardness and chemical durability. These raw materials are plentiful, easy to obtain, and relatively low in cost.

The following values are typical of the materials necessary for a ton of container glass.

TABLE 86

Material	Weight	By weight
	pounds	percent
Sand	1,312	55.92
Soda ash	475	20.25
Feldspar	181	7.72
Limestone	339	14.45
Slag	28	1.19
Other ingredients	11	0.47

Source: The Final Environmental Impact Statement in Ex Parte No. 295 (Sub-No. 1), *Increased Freight Rates and Charges 1973—Recyclable Materials*, p. 2-115.

Sand used in the manufacture of glass must be exceptionally pure. For example, less than 1 percent iron oxide will discolor glass. The raw materials are stored in bins, "silos" or sacks. The raw materials are weighed out and sent to the furnace. In large installations the weighing may be automatic, material being fed in a set sequence to a weighing machine so interlocked that further use is impossible until the correct weight is registered. When weighed out, the batch is

⁹⁷FEIS Ex Parte No. 295, p. 2-117.

tripped into a mixer, and is either discharged into a hopper that holds one "mixing" or is conveyed to a storage bin.

Extensive deposits of sand used for glassmaking in the United States are found in Pennsylvania, New Jersey, Illinois, Missouri, Oklahoma, West Virginia, Indiana, and South Carolina.

Cullet.—Crushed glass, known as cullet,⁹⁸ has traditionally been added to make the mixture of glass raw materials more workable. Cullet speeds up the melting process by softening at a temperature lower than the melting point of some of the batch constituents. This fluid cullet helps still-solid batch granules to move around and mix with other ingredients. Its use also saves energy. In recent years, manufacturers have developed techniques that enable them to increase the ratio of cullet to other raw materials.

Three categories of cullet are recognized by glass container manufacturers: (a) in-plant cullet, the remains of a defective batch, which is recycled into the glass furnaces; (b) commercial cullet, collected and shipped by cullet dealers; and (c) reclamation center cullet, that collected by civic and environmental groups and sold to container manufacturers on a delivered basis. In-house cullet is the most desirable type since its exact composition and purity are known. Commercial and reclamation center cullet, known as purchased or foreign cullet, are not utilized in glassmaking to the extent of in-house cullet. Purchased cullet is not, however, a "necessary" raw material substitute.⁹⁹

Until recent years, at most 5 to 10 percent of the batch consisted of cullet. But more recently, as a result of experimental work to develop markets for reclaimed glass, it has been found that the use of cullet can vary from 8 to 100 percent. Its present use, nonetheless, varies from an average of 10 to 20 percent, although in a few cases it is higher. The glass container industry which accounts for over 70 percent of the total glass output, consumes approximately 1 percent purchased cullet as an input. The flat glass and pressed and blown glass industries consume a larger portion of purchased cullet as an input.

The use of cullet is low for several reasons: (1) the raw virgin materials are low in cost and readily available; (2) cullet must be

⁹⁸Cullet, by definition, is waste or scrap glass that has been crushed into fragments suitable for introduction into the glass furnace along with virgin raw materials. It must be clean, free of metallic contamination and sorted by color.

⁹⁹MRI p. 2-15.

chemically acceptable, color sorted, clean and free of metallic contaminants; (3) manufacturers lack a steady source of cullet supply, and (4) since purchased cullet is not a necessary input, its use is often governed by intangible factors. Current recycling programs generally involve only clean glass from recycling centers or other clean scrap sources.

Owens-Illinois, Inc., the country's largest glass container manufacturer paid \$30 per ton for empty glass containers in 1976 compared to \$20 a ton in 1975. The price of sand averages less than \$10 per ton, soda and limestone—less than \$20 per ton and soda ash—less than \$30 per ton.

An alternative use of cullet is to make other secondary products such as (1) road construction materials (glasphalt and surry seal); (2) building materials (mineral wool and foam insulation); and (3) building construction materials (wall panels, impregnated concrete, tiles, flooring, building block, brick, and oil absorbents). A large variety of additional products such as sewer pipe and chicken grit show considerable promise. The use of waste glass in secondary products usually reduces or eliminates the need for extensive processing of the glass-rich mixture which is the product of municipal separation systems since some foreign material can be tolerated in most of these secondary products and color sorting is eliminated. Some of these products, individually, could utilize all the municipal waste glass available, if the supply were assured so that markets could be developed.

PART I

MOVEMENTS OF RECYCLABLES & VIRGIN COMMODITIES

Respondents.—There are very few movements of cullet in official territory because (1) prompt or industrial cullet is usually consumed at the generating plant; and (2) obsolete cullet from municipal wastes is transported by private carriage to nearby glass plants. For example, although former Penn Central served the major glass plants, it only originated 91 carloads of cullet in 1975.

In the East, the N&W submitted 11 examples of repetitive movements (three carloads or more a year) of cullet and 10 examples of repetitive movements of industrial sand. These represent 77 percent of its total cullet traffic and 50 percent of its total industrial sand traffic.

In 1971, the southern carriers established 100,000-pound rates on cullet within southern territory. Prior to this, the rates were on a 50,000-pound basis.

In official territory much of the glass sand moves on commodity rates reduced to meet motor carrier competition.

Except for a few point-to-point rates which were established to meet truck competition, industrial sand generally moves on mileage scale rates in southern territory.

In the West, glass sand or silica sand generally moves on 80,000-pound rates.

A. Respondents' revenue-variable-cost ratios.—The table below as developed from data introduced by the TEA, SFA, and the WRA. The number of movements shown includes both inter-and intrastate traffic.

TABLE 87

Average ratio of revenue to variable cost¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Virgin commodities</i>						
14 413 10 - Glass sand, unground -	165	30	150	62	147	20
<i>Recyclable commodities</i>						
32 299 24 - Cullet (broken glass)---	218	21	252	3	253	15

¹Averages reflect weighted ratio of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harrity of Western Railroad Association.

Opposing shippers offer no cost evidence for these commodities; and, therefore, respondents offer no rebuttal.

356 I.C.C.

TABLE 88

Commission's adjustment of respondents' revenue-variable-cost ratios

AVERAGE RATIO OF REVENUE-TO-VARIABLE COST PERCENT¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Virgin commodities</i>						
14 413 10 - Glass sand, unground -	172	21	148	31	148	12
<i>Recyclable commodities</i>						
32 299 24 - Cullet (broken glass)---	200	30	272	5	198	4

¹Based on interstate movements only.

Comparison of Commission's revenue-variable-cost ratios.— 1. *Cullet (32 299 24) vs. Glass sand (14 413 10).*—For each territory the ratio for the recyclable commodity, cullet, is higher than the ratio for the virgin commodity, glass sand.

Comparison of Commission's results with respondents' results.—The comparisons of the virgin commodity with the recyclable commodity are quite close except for the ratios for cullet in the West, where the respondents' ratio of 253 percent is substantially higher than the 198 percent shown in the Commission's results. This may be because respondents' results for cullet in the West are based on 15 movements while the Commission's results for cullet in the West are based on only 4 movements. Nine of the 15 movements have origins in the East, which is the cause for the increase in the number of movements of cullet in the East in the Commission data. Respondents' results in the East are based on 21 movements. Commission's results for cullet in the East are based on 30 movements.

In summary, the following table best illustrates the comparison between revenue to variable cost ratios for virgin commodities and recyclable commodities.

356 I.C.C.

TABLE 89

Average ratio of revenue to variable cost (percent)

	East		South		West	
	Respond- ent	Commis- sion	Respond- ent	Commis- sion	Respond- ent	Commis- sion
<i>Virgin</i>						
14 413 10 - Glass sand, un- ground	165	172	150	148	147	148
<i>Recyclable</i>						
32 299 24 - Cullet (broken glass)	218	200	252	272	253	198

IB

TRANSPORTATION CHARACTERISTICS

Industrial sand, which must be kept dry, moves in covered hopper cars, and has a 100-percent empty return ratio and sometimes moves in assigned equipment. The average weight in official territory is about 77 tons per car and the average haul on the former Penn Central, for example, was 215 miles.

PART II

HISTORICAL EVIDENCE ON UTILIZATION OF RECYCLABLE MATERIALS

Respondents.—The N&W contends that general increases have had no effect on its movement of cullet, which increased 169 percent tonnage-wise from 1970 to 1975. Fluctuations in volume in the intervening years are not correlated to freight rate increases.

The Rock Island indicates that movements of industrial sand have been quite stable and not affected by general increases.

The following table shows the tonnage of cullet handled from 1970 through 1975, as reported by respondents.

356 I.C.C.

TABLE 90

Cullet (STCC No. 32 299 24)

TONNAGE CARRIED—(1970-1975)

Terri- tory	Car- rier	1970	1971	1972	1973	1974	1975
East.....	N&W.....	24388	44881	40074	46319	66295	41188
South.....	Frisco.....	N/A	11370	7619	8704	6921	2921
West.....	Crip.....	N/A	N/A	0	0	0	864

Opposing shippers.—The Glass Container Manufacturers Institute, Inc. (GMCI), states that techniques for separating glass from solid waste by the froth floatation method are being developed. This method would require transportation in covered hopper cars or other closed equipment and would, it is argued, produce significant rail movements. At that point, freight rates would play a major role in decisions by municipalities as to whether they should initiate resource recovery programs involving the purchase and installation of necessary equipment to recover cullet. The movements of cullet by rail at present are *de minimis* since the foregoing technology has not yet been perfected.

PART III

SENSITIVITY OF RECYCLABLE MATERIALS TO CHANGES IN
TRANSPORTATION RATES

Respondents.—TEA notes that crushed glass has traditionally been added in the glass-making process to make the raw materials more workable; that it speeds up the softening process and lowers the melting point of the batch; that the fluid cullet helps stillsolid batch granules to move around and mix with other ingredients and thus argues TEA, cullet generally performs a separate and integral function in the manufacture of new glass which is complementary rather than competitive with the virgin material in the batch. In addition, cullet and industrial sand do not originate in the same areas, and, therefore, do not compete.

N&W contends that its movements of industrial sand and cullet are not competitive as to end-use. The cullet moving over its lines predominately is consumed by glass manufacturers whereas nine of the reported industrial sand movements were used by iron or steel companies for foundry use and the other movement was sent to a
356 I.C.C.

producer of welding flux. In addition, N&W has never been requested to adjust the rates on the basis of competition between cullet and industrial sand.

Although Gellman did not discuss the demand, supply, and prices for virgin glass and secondary glass, it did develop the mean transport price as a percent of delivered costs if the elasticity of demand/supply for the virgin and scrap commodity is perfectly elastic. From these results it determined that the transportation demand for virgin and scrap commodities is inelastic, and that rail transport elasticity is less than one.

TABLE 91

Derived elasticity of demand/supply required to obtain unit elasticity of transport demand assuming infinitely elastic supply

	Elasticity of supply/demand as input	Mean transport price as percent of delivered cost	Required elasticity of demand in order to obtain unit-elastic elasticity of transport demand	Required elasticity of supply in order to obtain unit-elastic elasticity of transport demand
	<i>Assumed</i> E_s E_d	<i>Percent</i> A	E_d	E_s
Virgin glass	0.0 0.0	41.3	2.421	1.421
Secondary glass	0.0 0.0	44.2	2.262	1.262

These figures indicate that changing rail rates for scrap or virgin materials will not proportionately change the movements of these commodities.

PART IV

EFFECTS ON INDIVIDUAL RAILROADS

The N&W indicated that because of the small amount of industrial sand and cullet originated, a change in rates would have no significant effect on their financial status. The Rock Island indicates that industrial sand is an important commodity for its line representing 1.17 percent of total revenue for 1975. It would therefore be affected by a change in rates.

356 I.C.C.

Other carriers submitted data showing the revenue/tonnage relationship of the particular commodities to total traffic, as shown below.

TABLE 92

Cullet (STCC No. 32 299 24) Percentage of tonnage or revenue of involved commodity to total carrier tonnage or revenue (1975)

Territory	STCC	Carrier	Car-loads	Ton-nage car-ried	Revenue from com-mo-dity	Percent to total ton-nage	Percent to total revenue
East.....	32 299-24	Chessie ConRail NW	91	6851	98702 124200	.005	.008
South.....	32 299 24	Frisco ICG LN SCL SOU	50 4 107 44	2921	40683 4237 59959 2731		

PART VI

ALTERNATIVE RATE STRUCTURES

Opposing shippers.—GCM1 contends that the logistics and economics of recovering and transporting cullet require the establishment of a basic rate structure for open-top and closed hopper car equipment based on average fully allocated costs from, to, and within ratemaking territories. The development of such a structure, it is argued, would assure the carrier of a reasonable profit and would encourage recycling.

PART VII

OTHER EVIDENCE

The environment would be benefited, as shown in the chart below, from the increasing use of cullet in the production of glass. However the FEIS concludes that transportation costs will not influence the utilization of cullet because there exists an unfilled demand for cullet that will not be met until new technology is developed and implemented to increase supply. The major reason for this, is that although cullet is technologically substitutable for virgin raw

356 I.C.C.

materials in the manufacture of glass and other products, the cost of recovering cullet and sorting it, when compared to the relatively low price of industrial sand and other raw materials makes it uneconomical to do so. It is also pointed out that most of the movements of cullet are short intraurban moves by motor carrier, and, therefore, a change in rail rates would have no effect on the movement of traffic.

TABLE 93

*Environmental profile when using 15 or 60 percent
cullet in making 1,000 tons of glass*

	15 percent cullet	60 percent cullet	Percent reduction
Raw materials (tons)-----	1,100	500	-54
Water discharged (gal.)-----	200,000	100,000	-50
Air emissions (tons)-----	13.9	10.9	-22
Solid waste (tons)			
Mining-----	104	22	-79
Net Post-consumer-----	1,000	450	-55
Energy consumption-----	16,150	15,175	-6

¹Varies according to recovery technology used.

Source: FEIS, p. 4-158.

DISCUSSION AND CONCLUSIONS

Cullet is used as an input in the manufacture of glass to speed up the melting of the virgin materials, or as the sole ingredient in the glassmaking process. It is technically and economically a functional input material. However, in actual practice the use of cullet, other than home cullet which is recycled within a plant, is a very minor portion of the feed of a glass manufacturer. The use of purchased cullet is also very low and it is generally consumed by glass manufacturers only when there is a shortage of home cullet.

The main restraints on the use of obsolete cullet in the glass making industry are technical limitations which make it difficult to separate the material from the consumer waste flow and eliminate contaminants. It is estimated that when the technology is perfected, that 60 percent¹⁰⁰ of the annual glass production will be recoverable as cullet. According to GCM and respondents, techniques for the separation of glass from the waste stream are still in the process of being developed. Although at some future date obsolete cullet may

¹⁰⁰Increased Freight Rates and Charges, 1972, 346 I.C.C. 88, 189 (1973).

be in competition with industrial sand, at the present time, the technology has not been implemented and its economic feasibility has not been established.

Next we will determine if the rate structure on this commodity is unjust and unreasonable. Our ratios on cullet are 200 in the East, 272 in the South, and 198 in the West. No special transportation characteristics were mentioned by respondents. The West and South presented data as to the amount of traffic moving over a period of years for two carriers and the East showed the tonnage for the N&W. In the South, the tonnage has fluctuated up and down however, there is an overall decline from 11,370 tons in 1971 to 2,921 tons in 1975 for the Frisco. The Rock Island only presented the tonnage for the year 1975, 864 tons. In the East, there were also fluctuations in traffic, however, a downward decline is not as evident.

Cullet was purchased for \$30 in 1976 by some glass manufactures, indicating that it is a relatively low-valued commodity. No year-to-year ratios of rate to price were presented by the parties in this proceeding, however, we note that in Ex Parte No. 281¹⁰¹ freight rates were an estimated 43.2 percent of delivered costs when the price of the cullet was \$20 a ton. We also are aware that in the South, general increases applied on cullet totaled 22.6 percent from the beginning of 1974 to the Ex Parte No. 313 level, and that in the East, the increases amounted to 27.6 percent. Rail rates are still a large component of the cost of delivered cullet. The Gellman study in its computation of the mean transport price as a percent of delivered cost found it to be 44.2 percent, if supply and demand are assumed to be infinite. The record also indicates that cullet is subject to diversion to private carriage.

With the development of new technology, the implementation of cullet recovery systems and the increasing utilization of cullet in secondary products, the area in which a consumer will be able to purchase cullet will be dependent to a large degree on the freight rate. The rate structure as evidenced by the high ratios in the three territories could act as an impediment to the implementation of recovery programs. We, therefore, conclude, that in consideration of all the evidence of record and that in view of the movements of this traffic by other modes, the ratio of rate to price, the value of the commodity, and the adjusted rate-variable cost ratio, that the rate structure on cullet is unjust and unreasonable. We, therefore, order that a reduction in cullet rates be made by 5 percent in the East and West and 15 percent in the South. Even though the lower rates may not be used to a great extent initially, we believe they will encourage

¹⁰¹Id. p. 191.

356 I.C.C.

the development and implementation of technological changes which may be needed to develop this market.¹⁰²

Since so little of this traffic is presently moving, the ordered reduction, will not jeopardize the financial stability of respondents. In fact, the reduction should attract more traffic to the railroads and, therefore, result in greater revenue overall.

LATEX GUMS, SYNTHETIC RUBBERS, RUBBER OR PLASTIC
SCRAP WASTE RECLAIMED RUBBER¹⁰³

(STCC NOS 08 423, 28 212, 40 26, 30 3)

Chemically rubber is a polymere of isoprene. It can be produced from the latex of rubber trees or its can be produced synthetically from petroleum and other substances such as potatoes and grains, coke, limestone, salt, and sulfur.

The rubber industry is composed of the following three sectors: (1) the industry which supplies new rubber; (2) the fabricated rubber products industry; and (3) the rubber reuse industry.

Imports of natural rubber (latex), predominantly from Southeast Asia, have shown a marginal growth over the period, exhibiting quite marked annual fluctuations. However, the synthetic rubber supply industry in the United States has expanded constantly since its inception in the Second World War. Consumption of new synthetic rubber in the United States has followed the production closely and exports have remained at a constant level. Various types of synthetic rubber can be produced depending on the type of petroleum isoprenes used in the manufacturing process. The various types of synthetic rubbers the their applications are shown in the table below.

¹⁰²The 1-percent waybill sample for 1975 shows revenue of \$12,472 for cullet in the East. Multiplied by the appropriate weighing factor, the revenue for the year in the East is \$1,683,720. The reduction will therefore reduce revenues by \$84,186. In the West, the revenue shown in the sample is \$2,800 and projected for the year it is \$378,000. The reduction will, therefore, reduce revenues by \$18,900. No southern movements are reported in the waybill, indicating that the reduction will not have an adverse effect on the southern carriers financial condition.

¹⁰³The following discussion of the manufacture and consumption of rubber and plastic is based on information from the Encyclopedia Americana, Vol. 23 (1976); the Encyclopedia Britannica, Vols. 18 and 19 (1973); "Economic Study of Salvage Markets for Commodities Entering the Solid Waste Stream", supra; FEIS in Ex Parte Nos. 319 and 295 (Sub-No. 1); and Shreve, N., *Chemical Process Industries*, supra; and the submissions of the parties.

TABLE 94
PROPERTIES AND APPLICATIONS OF SYNTHETIC RUBBERS

Type	Notable properties	Limiting properties	Typical applications
GR-S (Buna S)	Abrasion and heat resistance, medium resilience, hardness range.	Oil, tear, weather, and ozone resistance.	General substitute for natural rubber, tires (principally treads), mechanical goods.
Nitrile (Buna N)	Abrasion, heat, and aging resistance; resistance to mineral oil, gasoline, organic solvent, dilute acid, and alkali.	Resilience, tear resistance, processing.	Hose, seals, diaphragms oil resistant mechanical goods.
Neoprene	Excellent weather and flame resistance; heat and aging resistance; flex-life; medium oil and chemical resistance.	Hardness range; cold resistance; processing.	Jacket or sheath for insulated wire hose, mechanical goods of moderate oil and weather resistance.
Butyl	Good weather, ozone, acid and alkali resistance; excellent impermeability to air and some gases.	Low resilience.	Inner tubes, radiator and heater hose (for moderate service), ignition nipples.
Thiokol	Maximum oil and solvent resistance; weather and ozone resistance.	High compression set, low tensile strength and elongation, poor heat resistance.	Paint spray and gasoline hose, gaskets.
Silicone	Maximum heat and cold resistance; water and oil resistance.	Low physical properties, resilience, cost.	High temperature gaskets, coverings and mechanical goods.

Source: Encyclopedia Americana, Vol. 23, p. 745 d. (1976).

The following table shows the supply and consumption of new rubber for the years 1962 through 1972.

TABLE 95

Supply and consumption of new rubber in the United States, 1962 to 1972

(ALL FIGURES IN THOUSANDS OF LONG TONS)

Year	Import of natural rubber ⁽¹⁾	Production of synthetic rubber ⁽²⁾	Consumption of natural rubber ⁽¹⁾	Consumption of synthetic rubber ⁽²⁾	Exports of synthetic rubber ⁽¹⁾
1962.....	421.53	1,574.5	462.76	1,255.9	303.70
1963.....	379.53	1,608.5	457.23	1,306.8	283.21
1964.....	441.19	1,764.9	481.50	1,451.5	321.26
1965.....	445.32	1,813	514.71	1,540	281.78
1966.....	431.66	1,970	545.68	1,666	308.44
1967.....	452.80	1,912	488.85	1,628	299.80
1968.....	540.17	2,131	581.86	1,894	291.03
1969.....	585.28	2,250	593.3	2,024	226.49
1970.....	549.9	2,197	559.3	1,918	290.1
1971.....	612.7	2,241	602.3	2,079	269.8

⁽¹⁾Based on data from the U.S. Dept. of Commerce.

⁽²⁾Based on data from the Rubber Manufacturers' Association.

⁽³⁾Preliminary figures.

Source: FEIS Ex Parte No. 295 (Sub-No. 1) p. 2-165.

The fabricated rubber products industry is made up of those manufacturers who combine elastomers, fabrics, metal products, chemical and mineral fillers and produce tens of thousands of different products for the use of consumers and industry. The largest volume of products are canvas and rubber footwear, belts, hose, foam and sponge wire and cable covers, and the great variety of molded consumer and industrial products grouped together as mechanical rubber goods.

Manufacture of rubber products.—Crude rubber, whether natural or synthetic, comes to the factory in bales or boxes. In its raw form it has practically no value, but when it is mixed with various chemicals it can be used to form thousands of products.

To make the rubber more plastic, it is put in a mill where it is torn and kneaded. Compounding ingredients are then added to produce a hard or soft rubber. The compounded rubber is then prepared for use in molds by calendary, which rolls the rubber into sheets; or by tubing, which extrudes the rubber to a predetermined shape and

356 I.C.C.

size. The rubber is then vulcanized in molds or chambers (cured) by either the hot or cold method.

Rubber scrap.—The three users of waste rubber and rubber products (constituting virtually 100 percent of all rubber reuse in this country) are the retread industry, the rubber reclaim industry, and the tire splitting industry. The retread industry, the largest of the three, extends the useful life of worn tires by placing new tread on old carcasses. The second largest, the rubber reclaim industry, converts the rubber into a reuseable form so it may be worked back into conventional rubber products. The tire splitting industry, cuts out small rubber parts from the carcass and tread areas of waste tires.

Collection of rubber scrap.—Tires and innertubes are collected or accumulated mainly by tire stores, gasoline stations, fleet operators, and retreaders. This practice normally results in tire accumulations at convenient pick-up points. The bulk of rubber waste that is reprocessed is collected by local used-tire merchants. The used-tire merchant sells reuseable casings to retreaders and the remainder to scrap rubber brokers. Brokers operate on a national and international scale, purchasing scrap rubber from merchants and making volume sales to reclaimers and other waste rubber consumers. This system permits the waste consumer to buy in large quantities at fairly stable prices from established brokers instead of dealing directly with a number of small merchants. Having determined their usual requirements, reclaimers and other purchasers will usually place standing orders with brokers who subsequently place orders from merchants.

In the retread industry, the production of retreaded passenger car tires levelled off in the early 1960's at an annual production rate of approximately 36 million units. Production of new passenger tires continued to increase through the 1960's so that the ratio of the number of tires retreaded to the number of new tires produced declined steadily. The ratio of retreaded passenger tires to new tires decreased from 32 in 1960 to less than 20 in 1975. Although the production rate for retreaded truck tires continued to increase over the period, the corresponding ratio for truck tires also showed a decreasing trend. Estimates show that, in 1968, 17 percent of the passenger tires and 28 percent of the truck tires then in use were retreaded tires.

Modern tire retreading involves a series of inspection and processing steps. The major operations, other than inspections and control, are: buffing the worn tire or the removal of old tread by

356 I.C.C.

grinding, spraying the tire with vulcanizable rubber cement, laying strips of tread rubber circumferentially around the tire, and curing in a mold for an appropriate length of time. A fairly recent innovation substitutes the winding of a thin strand of thread stock to build up the desired profile for the conventional means of laying the tread. Another innovation is the use of partially cured tread in order to shorten the overall curing time required and, thus, minimize the deleterious effects generated by process heat.

There are several factors that are limiting the growth of the retread industry: (1) purchasers of passenger car tires have a tendency to view retreads as inferior to new tires, regardless of the quality of the latter; (2) cheaper lines of new tires have been specifically designed to compete in the "retread" cost market; and (3) the wide variety of tire sizes and tread widths, force the good retreader to measure each tire, maintain a large inventory of molds, and juggle his inventory to maintain a balance of marketable sizes. All of these above factors have tended to increase the cost of retreading.

The reclaimed rubber industry converts used or rejected rubber products into reusable materials. Rubber reclaimed from one type of product is generally reused in the manufacture of products of the same type; for example, scrap tires are reclaimed and converted to a soft workable state where they are capable of being blended into compounds for new tire manufacture. Exceptions to this general rule are products such as the following: adhesives, wire coverings, pipe covering, brake linings, rubberized asphalts and tars. These products, however, represent a small-volume outlet for the reclaimed rubber industry.

Reclaimers use two categories of waste, namely obsolete consumer products and some scrap items of the rubber products industry.

Road-worn tires are generally available in sufficient quantity within 300 miles of reclaim plants. Truck, bus and off-the-road tires are also generally available in quantity; reclaim usage of these tires is small, however, due to higher costs of handling and processing. Other than road-worn tires and innertubes, virtually no other discarded consumer rubber products are reprocessed by reclaimers.

The remaining portion of the Nation's waste rubber is consumed by the tire splitting industry. The companies constituting this industry use worn-out bus, truck, and passenger car tires. The bead wire is removed by cutting and stamping; and the bead is peeled off

356 I.C.C.

the tire carcass and the remainder of the carcass is split into three sections. The carcass sections are planed to uniform thickness and placed in a press which die cuts out the final product. Typical products are gaskets, shims, automotive tail pipe insulators, and the doormats. Circular and square pieces are also stamped out and bolted or pinned together to form items such as conveyor rollers for handling produce, light load V-belts, and bumpers for docks and loading platforms.

The following table summarizes the consumption of new and reclaimed rubber in 1969.

TABLE 96

New and reclaimed rubber consumption in 1969, in 1,000 tons, percent, and by major industry segment

Segment	New rubber		Reclaimed rubber		Total	
	Tons	Per-cent	Tons	Per-cent	Tons	Per-cent
Tires.....	1,950.3	67.0	188.6	67.4	2,138.9	67.0
Wire-cable.....	29.1	1.0	.....	.....	29.1	0.9
Foams.....	101.9	3.5	.....	.....	101.9	3.2
Footwear.....	174.6	6.0	2.8	1.0	177.4	5.6
Mechanical goods.....	451.2	15.5	16.5	5.9	467.7	14.7
All other.....	203.8	7.0	71.9	25.7	275.7	8.6
Total.....	2,910.9	100.0	279.8	100.0	3,190.7	100.0

Source: MRI Report, *supra*, p. 9-2.

Plastics include a wide variety of chemical substances the most common being polyethylene, polystyrene, and polyvinyl chloride. Most plastics are made with oil refinery byproducts or natural gas purification plant products.

There is some recycling of new plastic scrap within a plant fabricating thermoplastic when the chemical content of the scrap is known. In addition, these fabrication wastes are sold to scrap dealers which will regrind the scrap, color blend it, and sell it for reuse. This scrap is then sold to industries where plastic properties, performance and colors are not important, critical process are not used, and the cost of plastic resin is a high proportion of total production cost. Examples of these are the toy industry, the houseware industry, and the plastic pipe industry.

356 I.C.C.

The recycling of old or obsolete plastic scrap is very limited. Technological problems impede the reuse of plastics in the following ways: (1) methods for separating plastic from municipal waste are unavailable; (2) identification of the type of scrap is difficult; (3) deterioration of the plastic; (4) lack of purification and upgrading techniques; (5) no standard guides; and (6) contaminants in plastic.

The following shows the prices paid by consumer some for the various rubber and plastic scrap commodities in the earlier 1970's.

TABLE 97

Commodity	Price
<i>Rubber</i>	<i>Per ton</i>
Retread tuffs.....	\$25 - \$35
Natural rubber inner tubes.....	120 - 160
Butyl rubber inner tubes.....	100 - 120
Rubber for reclaiming.....	0 - 10
Tires for retreading.....	.75 - 1.00 (per tire)
Tires for splitting.....	.15
<i>Plastic fabrication waste</i>	
Clear polystyrene.....	10 - 20
Clear vinyl.....	90 - 110
Cellulose acetate.....	160

Source: Salvage Markets for Materials in Solid Wastes prepared by Midwest Research Institute for the EPA, p. 81-83, (1972).

PART IA

MOVEMENTS OF RECYCLABLE & VIRGIN COMMODITIES

Respondents.—Crude, artificial, or synthetic rubber from points in the West to points in the South moves on point-to-point rates with minimum weights ranging from 80,000 to 140,000 pounds. Latex from the East to South and within the South moves on 70,000- and 160,000-pound tank car rates. In the West, the average loading of synthetic rubber is in excess of 100,000 pounds per car.

Imported natural crude rubber does not move on an uniform basis in the West. The rates are generally established on the basis of particular circumstances and conditions; for example, port equalization and motor carrier competition.

356 I.C.C.

Rates on rubber scrap are published subject to minimum weights of 40,000, 45,000 and 50,000 pounds. Scrap rubber, hard rubber, pulverized in bags, in the West moves on 36,000-, 40,000-, and 45,000-pound rates. In the Southwest, Scrap rubber also moves on 75,000-pound rates.

Scrap plastic moving between points in the South is subject to a mileage scale of rates minimum 50,000 pounds. Heavy loading rates have been established subject to a minimum of 70,000 and 90,000 pounds, however, no set formula for point-to-point rates have been established.

Plastic scrap in the West moves on the basis of 40,000- and 45,000-pound rates depending upon the size of the car. In the East, the transportation of plastic scrap is relatively insignificant.

ConRail indicates that railroads have, when requested, established rates on reclaimed rubber which are competitive with other modes. For example, it points out that it is trying to establish highway competitive rates on reclaimed rubber in open-top hopper cars from a point at Windsor Locks, Conn., to Concord, N.H., and Cape May, N.J., where the rubber is shredded and mixed with coal to form fuel in municipal power plants.

In 1973, Penn Central handled 11,373 net tons of reclaimed rubber of which 7,012 tons originated at Naugatuck, Conn.

The preponderance of reclaimed rubber movements handled by the Southern are within the South although some traffic does move to western trunkline territory. The rates within the South are published at class 27 1/2 rates, minimum 40,000 pounds. However, substantially reduced point-to-point rates have been established for specific movements with minimum weights of 24,000, 30,000 and 50,000 pounds and excess.

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the Eastern Railroads, Southern Freight Association, and the Western Railroads. The number of movements shown includes both inter- and intrastate traffic.

356 I.C.C.

TABLE 98

Average ratio of revenue to variable cost¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Virgin commodities</i>						
08 423 - Latex gums (crude natural rubber).....	208	33	227	11	298	5
28 212 - Synthetic rubbers.....	274	26	219	6	228	10
<i>Recyclable commodities</i>						
30 3 - Reclaimed rubber.....		0	228	3	241	9
40 26 - Rubber or plastic scrap or waste.....	128	23	164	6	164	38

¹Averages reflect weighted average ratio of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harranty of Western Railroad Association.

Comparison of respondents' revenue-variable-cost ratios

1. *Reclaimed rubber (30 3) vs. latex gums (08 423) and synthetic rubbers (28 212).*—Because there are no movements of reclaimed rubber in the East, this comparison can be made only in the South and West. For both regions, the comparison shows similar ratios for the recyclable commodity vs. the virgin commodity.

2. *Rubber or plastic scrap or waste (40 26) vs. latex gums (08 423) and synthetic rubbers (28 212).*—The ratios for the virgin commodities are significantly higher than the ratio for the recyclable commodity, rubber or plastic scrap or waste, in each region.

356 I.C.C.

Commission's adjustment of respondents' revenue-variable-cost ratios

TABLE 99

AVERAGE RATIO OF REVENUE TO VARIABLE COST (percent)¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Virgin commodities</i>						
08 423 - Latex gums (crude natural rubber).....	207	33	208	10	164	4
28 212 - Synthetic rubbers.....	270	25	224	13	204	7
<i>Recyclable commodities</i>						
30 3 - Reclaimed rubber.....	193	1	210	2	181	8
40 26 - Rubber or plastic scrap or waste.....	120	22	169	8	149	31

¹Based on interstate movements only.

Comparison of Commission's revenue-variable-cost ratios

1. *Reclaimed rubber (30 3) vs. latex gums (08 423) and synthetic rubbers (28 212).*—The results in the South and West show similar ratios for the recyclable and virgin commodities. The ratio for the recyclable commodity, reclaimed rubber, in the East, (193 percent) is lower than the ratio for either virgin commodity. However, the ratio for reclaimed rubber in the East is based on only one movement.

2. *Rubber or plastic scrap or waste (40 26) vs. latex gums (08 423) and synthetic rubbers (28 212).*—The ratios for the virgin commodities, latex gums and synthetic rubbers, are significantly higher than the ratio for the recyclable commodity, rubber or plastic scrap or waste, in all three regions.

Comparison of Commission's results with respondents' results.—The comparisons and ratios shown above are similar with the following exceptions:

1. Respondents show no movements of reclaimed rubber (30 3) in the East, while the Commission's results show one movement. This 356 I.C.C.

movement was submitted by the western railroads but was actually originated by an eastern railroad.

2. Respondents show a ratio of 298 percent for latex gums (08 423) in the West, while the Commission's results for that commodity in the West shows a ratio of 164 percent. There are two reasons for this difference (a) respondents' results include an intrastate movement with a ratio of revenue to variable cost of 523 percent which is not included in the Commission's results, (b) respondents' ratio for the West is a simple average ratio while the Commission's ratio is a weighted average ratio.

3. Respondents' ratio for reclaimed rubber in the West (241 percent) is higher than the ratio (181 percent) for that commodity in the West shown in the Commission's results. This is due principally to the fact that their ratio for the West is a simple average ratio while our ratio for reclaimed rubber in the West is a weighted average ratio. The simple average ratio for the Commission's results is 216 percent, which is much closer to the ratio of 241 percent shown by respondents.

PART IB

TRANSPORTATION CONDITIONS

Respondents.—Shipments of synthetic and natural crude rubber are usually made in general service unequipped 50-foot boxcars. In some cases the density of a particular type or grade of rubber will require the use of 60-foot cars. Synthetic crude rubber moves regularly on a year-round basis. Since its production is closely tied to petroleum production, there are periods of over supply when storage-in-transit arrangements are used.

The ICG had 1 movement of reclaimed rubber which had 30 cars per year. The average weight per shipment was 39.60 net tons and the average mileage was 709.

PART II

HISTORICAL EVIDENCE ON UTILIZATION OF RECYCLABLE MATERIALS

Respondents.—Although recovery of plastic has been difficult, the TEA notes that technological breakthroughs in the recycling of this material have been developed. It indicates that a new process, which is a utilization of selective wetting characteristics, separates polyvinylchloride, polyethylene and polystyrene from the consumer

356 I.C.C.

waste stream.¹⁰⁴ Other pilot projects have recycled plastics by using solvents to remove plastics from industrial wastes. However, these programs are in the developmental stages. It is this lack of existing technology which can separate plastics from other wastes, and not rail rates, argues TEA, that have inhibited the recycling of this scrap.

The amount of crude natural rubber handled by N&W has increased since 1971, because of incentive (single car) point-to-point rates published from the North Atlantic ports and greater use of the port of Norfolk, Va.

Synthetic rubber originations in the southern district have increased 210 percent from 1967 to 1974. However, the percentage increase of scrap rubber or plastic compared to the total of scrap, natural and synthetic shows an increase of only 1 percent.

In the West, KCS and MP reported that the number of cars handled and the tonnages of synthetic rubber increased between 1970 and 1973. However, a decrease occurred in 1974 and 1975 caused by the depressed automobile industry. There was a similar pattern noted for the movement of natural rubber. In the Southwest, rubber and plastic scrap originations increased 128 percent from 1967 (37,011 tons) through 1974 (84,448 tons) for these two carriers. Also, where originations were 40 percent of total tons carried in 1967, originations grew to 52 percent of total tons carried in 1974. The revenue per ton from plastic or rubber scrap increased 18 percent from 1967 to 1974 compared to increased revenues on all traffic of 60 percent.

The total amount of scrap rubber and plastic handled by MP and KCS increased from 605 carloads in 1971 to 959 carloads in 1975. The amount of plastic and rubber scrap handled by KCS has decreased in the last few years, although there is no indication that the decrease in volume is the result of rate increases.

The following chart prepared by the TEA shows the tonnage originated and gross revenue derived therefrom for rubber or plastic scrap.

¹⁰⁴"Purchasing Management," May 3, 1976.

356 I.C.C.

TABLE 100

Year	Tons originated				Gross freight revenue			
	U.S.	East	South (000)	West (000)	U.S.	East (000)	South (000)	West
1966	357,224	144,642	39	174	\$3,499,364	\$1,736,495	\$585	\$1,178
1967	285,997	144,030	37	105	3,345,162	1,785,672	580	979
1968	291,649	153,568	50	89	4,031,618	2,068,685	768	1,195
1969	300,488	146,747	64	89	4,534,170	2,091,830	970	1,472
1970	255,859	121,926	64	70	4,084,350	1,846,376	997	1,241
1971	250,340	110,131	67	73	4,600,823	1,902,146	1,197	1,502
1972	264,526	98,293	81	85	4,915,018	1,915,446	1,316	1,684
1973	289,687	116,755	82	91	5,132,000	1,937,000	1,395	1,800
1974	272,362	92,915	84	95	6,045,000	2,227,000	1,560	2,258

This table shows the amount of latex and synthetic rubber carried by the various reporting carriers or in a district from 1970 through 1975.

356 I.C.C.

TABLE 101

Latex, synthetic rubber, and rubber and plastic scrap (STCC Nos. 08 423, 28 212, and 40 26)

Territory	STCC	Carrier	Tonnage carried (1970-1975)				
			1970	1971	1972	1973	1974
East	28 212	NW	21620	21633	58509	87531	84900
South	08 423	So. Dist.	126335	139168	139073	157374	152706
	28 212	So. Dist.	69281	123957	169372	208256	180994
West	08 423	KCS	N/A	53006	52439	46922	11946
	---	MP	34784	40294	55780	48536	51996
	---	West. Dist.	135027	164576	202075	203680	239987
	28 212	KCS	N/A	1141908	1264188	1318729	1288528
	---	MP	401582	428239	503269	587320	560566
	---	West. Dist.	2245386	2444427	2758835	2761648	2674746
	---						11705093

356 I.C.C.

The average revenue in the South for reclaimed rubber is shown in the following table. The reasons for the high rates in 1971 and 1972 are unexplained.

TABLE 102

Reclaimed rubber (STCC No. 303)

(IN DOLLARS PER TON)

Year	Average value	Average rate on tons carried	Average rate on tons originated	Total tons originated	Ratio rate to price on	
					Tons car-ried	Tons origi-nated
	(¹)	(²)	(³)			
1974.....	\$260.00	\$11.65	\$22.90	6,944	4.5	8.8
1973.....	226.00	10.39	24.18	6,120	4.6	10.7
1972.....	224.00	7.26	73.21	2,905	3.2	32.7
1971.....	NA ¹	8.27	69.23	3,877	NA ²	NA ³
1970.....	230.00	8.02	34.66	10,176	3.5	15.1
1969.....	230.00	7.57	31.16	9,778	3.3	13.5
1968.....	230.00	7.29	22.77	12,954	3.2	9.9
1967.....	230.00	7.67	21.76	11,446	3.3	9.5
1966.....	230.00	8.38	19.47	16,171	3.6	8.5
1965.....	230.00	7.99	22.02	12,370	3.5	9.6

¹Reclaimed Rubber, Statistical Abstract of the United States.²ICC Freight Commodity Statistics, Class I, Southern District.³NA—Not available.

Respondents have been moving less of this traffic in the southern district in the 1970's than in the 1960's both as a percentage of all freight traffic and originated tonnage. This is traced to the decline in the use of reclaimed rubber. It is also noted that reclaimed rubber has declined as a percentage of total new rubber consumption.

The following table shows the tons originated for the other two territories.

TABLE 103

Reclaimed rubber tonnage originated (STCC No. 303)

Year	East	West
1969.....	87,145	12,992
1970.....	85,208	8,764
1971.....	61,116	13,969
1972.....	46,710	10,385
	356 I.C.C.	

Reclaimed rubber tonnage originated (STCC No. 303)—Continued

Year	East	West
1973.....	29,246	8,370
1974.....	16,582	9,517

Source: Freight Commodity Statistics, class I Railroads.

Opposing shippers.—The Rubber Reclaimers Association, Inc. (RRA), argue that rail rates do have a significant effect on the movement of reclaimed and scrap rubber and that their members are shipping declining amounts of traffic by rail due to increased rates. RRA refers to evidence submitted by the Southern and points to rates on reclaimed rubber which are higher than those on crude and synthetic rubber; notes that the rates on reclaimed rubber and scrap plastic have been more than those on latex and synthetic rubber; contends that from 1965 to 1974 the value of synthetic rubber and crude natural rubber has increased by \$134 and \$280 a ton, respectively, compared to a \$30 per ton increase in value for scrap plastic and scrap rubber; contends that the average rate on scrap rubber and plastic scrap during that period, however, was \$7.33 per ton compared to \$5.17 a ton on synthetic rubber and \$7.49 for crude natural rubber; and concludes that the rates on the recyclables are unjust, unreasonable and discriminatory.

RRA also contends carrier revenue losses on recyclables caused by switching movements in inter- or intraterminal switching are not the case in the rubber reclaiming industry. For example, at the East St. Louis, Ill., facility of the Midwest Rubber Reclaiming Company (Midwest) only 8 out of 228 carloads received in 1975 had local switching. In another plant in Tallapoosa, Ga., no additional switching was involved out of the 75 carloads received in 1975.

Railroads, it is alleged, are losing recycling traffic, specifically reclaimed rubber, because of the increasing freight rates. A reduction in freight rates it is argued, could increase the movement of these commodities in heavy volume rail carloads between more distant points.

PART III

Respondents.—Chessie contends that there is no direct competitive relationship between rubber or plastic scrap or waste on the one hand, and, on the other, latex gums and synthetic 356 I.C.C.

rubbers. On these commodities, characteristics other than freight rates are far more important in determining whether the recyclable material is directly competitive with virgin natural resource materials in the manufacturing process. Important factors are the waste product's price, chemical composition, quality, volume, availability, and compatibility of the waste product in the production process.

Although Gellman did not discuss the demand, supply, and prices for virgin rubber and secondary rubber, it did develop the mean transport price as a percent of delivered costs if the elasticity of demand/supply for the virgin and scrap commodity is perfectly elastic. From these results it determined that the transportation demand for virgin and scrap commodities is inelastic, and that rail transport elasticity is less than one.

TABLE 104

Derived elasticity of demand/supply required to obtain unit elasticity of transport demand assuming infinitely elastic supply

	Elasticity of supply/demand as input	Mean transport price as percent of delivered cost	Required elasticity of demand in order to obtain unit-elastic elasticity of transport demand	Required elasticity of supply in order to obtain unit-elastic elasticity of transport demand
	Assumed E_s E_d	Percent A	\hat{E}_d	\hat{E}_s
Virgin rubber-----	On On	4.6	21.739	20.739
Secondary rubber --	On On	6.7	14.925	13.925

Opposing shippers.—The RRA indicates that its members for the most part can use only scrap as their raw material in producing their primary product, reclaimed rubber. However, it is argued that the reclaimed rubber competes in the marketplace with virgin counterparts. Rates on the raw material (scrap) and reclaimed rubber are, therefore, important if the commodity is to continue to compete effectively.

RRA contends that the rates on reclaimed rubber are unreasonably high in comparison with those to crude or synthetic rubber.

Certain ecological savings are also made by the use of reclaimed rubber. One, is a decrease in solid waste. Secondly, reclaimed

356 I.C.C.

rubber which is mixed with natural rubber cuts power costs by 20 percent.

PART IV

EFFECT ON INDIVIDUAL ROADS

The following chart shows the importance of the involved traffic to the reporting carriers.

TABLE 105

Rubber and plastic scrap (STCC No. 40 26)

PERCENTAGE OF TONNAGE OR REVENUE OF INVOLVED COMMODITY TO TOTAL CARRIER TONNAGE OR REVENUE (1975)

Territory	STCC	Carrier	Carloads	Tonnage carried	Revenue from commodity	Percent to total tonnage	Percent to total revenue
East -----	40 26 -----	Chessie --			264,933		
		ConRail--		26,148		0.01995	
		NW-----		5,504	70,505	0.0038	0.0072
South-----	40 26 -----	Frisco ---		192	2,508		
		ICG-----	596				
		LN-----	788	20,108	232,536		
		SOU-----		16,027			
West-----	40 26 -----	KCS-----	377	13,541	124,585		0.001
		MP-----	582	20,180	30,586		0.036

PART VII

According to the FEIS, rubber recycling is hindered by the (1) relatively low cost of primary rubber; (2) increasing costs of retreading tires; (3) decreasing demand for retreaded tires; and (4) increasing competition for low-priced tires.

The consumption of rubber scrap by the retreading industry, the rubber reclaim industry and the tire splitting industry has been declining since 1962. This decline has been caused by competition from cheaper tires, consumer preference for new tires, and the need for producing a wider variety of tire sizes. However, the reclamation of rubber is not sensitive to changes in the rail transportation rates, and rates have had no significant effect on the declining consumption of rubber. This is because used tires are available close

356 I.C.C.

to the reclaiming plants and they are, therefore, transported by motor carrier.

The reclamation and reuse of plastic is also not responsive to changes in transportation rates according to the FEIS. First, it states that industrial scrap, which is almost entirely recovered, is generally recycled within a plant, and, therefore, no rail transportation is involved. Secondly, obsolete plastic scrap is rarely recovered, and, therefore, transportation is also not involved. It is, therefore, concluded, that freight rates have no material effect on the recycling of plastic scrap. It is shown that the major obstacle to recycling is inadequate recovery systems, contamination, the lack of purification technology, lack of markets, and the difficulties in economically collecting the material.

DISCUSSION AND CONCLUSIONS

Plastic scrap does not compete with latex or synthetic rubber. It is not technically capable of being substituted for the virgin materials by a consumer of these products. Technological limitations on its supply also preclude a competitive relationship since the recovery of the plastic scrap from the waste stream is difficult.

The evidence also supports the conclusion that scrap rubber does not compete with synthetic rubber or latex. These commodities move to different consumers (retreaders, reclaimers and tire splitters, who consume virtually 100 percent of the scrap versus integrated tire manufacturers, wire cable industries, et cetera). There is no indication that virgin or scrap materials can be used interchangeably by these consumers.

However, reclaimed rubber is interchangeable with latex or synthetic rubber. After the rubber is reclaimed, it is generally reused in the manufacture of products of the same type from which the rubber was reclaimed. It displaces synthetic rubbers or latex gums as an input,¹⁰⁵ but it is unclear whether it is added to speed up the softening process of the virgin materials or otherwise complementary to its use. Respondents offered no probative evidence on this issue and the RRA merely states that it is competitive with the virgin materials. However, the rate structures on latex gums, synthetic rubbers, and reclaimed rubber generally favors the movement of reclaimed rubber. The adjusted cost ratios for the virgin materials are generally higher in the three territories.

¹⁰⁵Certain new tire formulations are incompatible with reclaimed rubber which limits the degree of substitutability. See *Salvage Markets for Materials in Solid Wastes*, *supra*, p. 81.

with the exception of latex gums in the West which has a ratio of 164 compared to 181 for reclaimed rubber. However, the evidence does not establish that this difference has resulted in a benefit to the movement of the latex to the detriment of reclaimed rubber. The traffic originated in the West has fluctuated up and down, and those fluctuations are correlated to the overall demand for rubber by consuming industries (tire industry) not increases in freight rates. We, therefore, conclude that the rate structure on reclaimed rubber in the East, South, and West is nondiscriminatory.

Next, we will discuss the issue of unreasonableness. Plastic and rubber scrap have an adjusted ratio of revenue to variable cost of 120 in the East. The amount of tonnage originated in the East has fluctuated up and down although there is a downward trend overall. However, there is no indication that the rate structure is impeding the movement of the commodity. Instead, other factors such as consumer preference and technological limitations appear to be the cause of the decline. We, therefore, conclude, based on all evidence of record, that the rate structure is just, reasonable, and nondiscriminatory.

In the South, the ratio of revenue to variable cost is 169. The amount of traffic originating over a period of years in the southern district has been increasing except for 1975 during a period of recession. This indicates that the rate structure is favorable to the movement of these commodities, and is just, reasonable, and not unjustly discriminatory.

The same conclusion is warranted in the West where the adjusted revenue to cost ratio is 149. The amount of traffic originated has decreased from a high period in 1966, however, in recent years the amount of tonnage has been rising. The western carriers also show that the revenue per ton on this commodity has increased only 18 percent from 1967 to 1974, as compared to a 60-percent increase on all other traffic. We, therefore, find that the rate structure on plastic and rubber scrap in the West, is just, reasonable, and nondiscriminatory.

Reclaimed rubber has an adjusted revenue-cost ratio, of 193 in the East. The amount of this traffic originated by eastern respondents has been decreasing steadily since 1969. Although we realize that overall consumption of this commodity is declining, this does not fully explain the 80-percent reduction in traffic originated, and respondents offered no explanation. We also note that traffic is being diverted to motor carriers. This indicates that the rate structure is unreasonably impeding the movement of this commodity

by rail. We, therefore, order that the rates should be reduced 5 percent in the East. This reduction will not adversely affect the financial status of the eastern carriers since the traffic is a very small portion of total tonnage, and it should enable them to maintain and attract a greater share of the market thereby increasing overall revenues.¹⁰⁶

The adjusted ratio of revenue to variable cost in the South is 210. Respondents have noted that they are moving less of this traffic tonnage-wise and as a percentage of originated traffic. Although the decrease in the amount originated may be partially explained by the overall decline in the consumption of this commodity, the revenue to variable cost ratio may also be a significant factor affecting its movement by rail. Freight rates, as can be seen from the decreased tonnage in 1971 and 1972, do have a discernible impact on the amount of traffic moving by rail. We also note that although the ratio of rate to price on traffic originated in the South has remained relatively stable between 8 and 9 percent (except for the period 1969 and 1973), this ratio is higher than the ratio for traffic carried in the South. We, therefore, find that the rate structure, based on all the evidence of record has not been shown by the carriers to be just and reasonable. To correct this situation, we will order a reduction in rates of 20 percent in the South. The revenue derived from this commodity in the southern district is only 0.006 of total revenue and the reduction will not adversely affect the financial status of these carriers.¹⁰⁷

In the West the adjusted revenue-cost ratio is 181. The amount of reclaimed rubber originated has fluctuated up and down over the years and there is no discernible downward trend in its movement. We, therefore, conclude that the rate structure based on all the evidence of record, is just, reasonable, and nondiscriminatory in the West.

TABLE II COMMODITIES

The following is a discussion of the commodities contained in table II. These commodities have not been paired with potentially competitive virgin materials, and the issue of discrimination is not involved. Our discussion of the evidence presented, will, therefore, focus on the issue of the effect of general increases on the rate

¹⁰⁶The Freight Commodity Statistics in 1974 show the revenue from this commodity as \$375,000 in the East. The rate reduction will, therefore, reduce revenue by \$18,750.

¹⁰⁷The 1974 Freight Commodity Statistic show the gross revenue for this commodity as \$159,000 in the South. The reduction will, therefore, result in a loss of revenue of \$31,800.

structures of these commodities and whether such rate structures are unreasonable.

GENERAL

Movements presented.—The WRA received 61 movements of the commodities listed in table II. Its members were to submit data on the two largest movements in which it participated for each of the commodities. After the elimination of movements which contained insufficient information there were 53 movements left, comprised as follows.

Commodity	Supplemental moves
Bakery refuse or sweeping feed.....	3
Steel shipping containers.....	17
Wood scrap or waste.....	2
Bags, old burlap.....	6
Beverage containers returned empty.....	16
Total.....	42

The Southern Railway showed the tonnages selected under its repetitive movements and the percent of the selected movements to total tons.

Commodity	Total tons originated	Tons selected	Percent of selected movements to total tons
<i>Percent</i>			
Steel shipping containers.....	12,010	4,081	34
Bags, old burlap.....	293	102	35
Bags, old, value for conversion.....	434	302	70
Beverage containers reclaimed.....	11,393	1,367	12
Total.....	24,130	5,852	24

Respondents' revenue-variable-cost ratios.—The table below was developed from data introduced by the Eastern Railroads, Southern Freight Association, and the Western Railroads. The number of movements shown includes both inter- and intrastate traffic.

TABLE 106

Average ratio of revenue to variable cost¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Recyclable commodities</i>						
20 511 18 - Bakery refuse.....	272	4	.....	0	288	3
24 293 - Shavings or sawdust.....	123	12	126	58	139	12
34 912 - Steel shipping cont.....	128	6	174	7	159	17
40 23 - Wood scrap, waste.....	95	3	115	1	170	2
40 291 14 - Mun. garbage waste.....	.....	0	.....	0	.....	0
41 114 34 - Bags, old, burlap.....	.....	0	218	5	166	6
41 115 80 - Bags, old, no value for further used.....	.....	0	187	3	.....	0
42 111 42 - Beverage containers re- turned empty.....	63	24	70	13	67	16

Averages reflect weighted average ratio of revenue to variable cost as taken from statements for the Eastern Railroads and Southern Freight Association and reflect simple average ratio computed from evidence submitted by witness Harrity of Western Railroad Association.

Commission's adjustment of respondents' revenue-variable-cost ratios

TABLE 107

Average ratio of revenue to variable cost (percent)¹

STCC	East		South		West	
	Ratio	Number of movements	Ratio	Number of movements	Ratio	Number of movements
<i>Recyclable commodities</i>						
20 511 18 - Bakery refuse.....	238	4	.....	0	191	3
24 293 - Shaving or sawdust.....	124	10	117	33	130	10
34 912 - Steel shipping cont.....	128	9	167	7	173	11
40 23 - Wood scrap, waste.....	84	4	108	1	221	1
40 291 14 - Mun. garbage waste.....	.....	0	.....	0	.....	0
41 114 34 - Bags, old, burlap.....	91	1	205	6	177	4
41 115 80 - Bags, old, no value for further use.....	.....	0	195	2	.....	0
42 111 42 - Beverage containers re- turned empty.....	69	24	55	10	64	12

¹Based on interstate movements only.

Comparison of Commission's results with respondents' results.—The Commission's results approximate those of respondents with the following exceptions:

1. Respondents show a ratio of 288 percent in the West for bakery refuse (20 511 18). The Commission shows a ratio of 191 percent in the West for the same commodity. In each case, the ratio was based on the same three movements. However, respondents' ratio is a simple average ratio, while the Commission's ratio is a weighted average ratio. This accounts for a major portion of this difference as the simple average ratio of revenue to variable cost for the three movements for the Commission's results is 235 percent.

2. Respondents show no movements of bags, old, burlap (41 114 34) in the East. The Commission's results for the East show a ratio of 91 percent for one movement. This is based on one movement which originated on the Penn Central but was submitted by the western railroads. The western railroads show a ratio of 98 percent for that same movement.

BAKERY REFUSE (STCC No. 20 511 18)

Respondents.—The L&N traffic statistics show that the amount of bakery refuse handled in 1975 was 77 cars or 2,966 tons with a gross revenue of \$21,731. No unit slips on these movements were presented, however. The ICG system handled 914 cars in 1975 which produced revenues of \$720,407. However, no unit slips on these movements were presented. The N&W reported that it had no originating movements of bakery refuse, and sweeping, feed in 1975.

Opposing shippers.—International BAKERAGE, Inc., recycles bakery waste and flour mill wastes. It collects these wastes and processes them into a form usable as an animal feed ingredient. Ninety percent of the waste is converted into a useful product, the other 10 percent is lost as water vapor in the dehydration process. The product is then shipped to the final destination where it is used generally as a substitute for corn in a soybean mix. During 1975, it processed 157,000 tons of bakery waste.

International BAKERAGE complains that the bakery waste should be classified as "waste or scrap" instead of as "Bakery Refuse or sweeping feed" under STCC No. 20 511 18 for the inbound shipments and "Cake or meal, nec" STCC No. 20 999 72 for the outbound shipment. It is contended that the entire movement, both inbound and outbound should be classified as a recyclable. This, it is argued, is necessary for International BAKERAGE which uses rail transit rates.

356 I.C.C.

In reply, the SFA argues that this matter is being considered in detail in docket 35904, *International Bakerage, Inc. v. Central of Georgia R. R. Co.*,¹⁰⁸ and that consideration of this matter in this proceeding is therefore inappropriate.

Conclusions.—We agree with respondents on the matter of bakery waste being a recyclable. We have decided in the previous decision that the outbound movement should not be classified as waste or scrap. This matter is now being considered in the courts and, therefore, it would be improper, based on the scant amount of evidence presented on this issue in this proceeding to make a determination herein.

The adjusted cost ratios of bakery refuse are 238 in the East and 191 in the West. No originating movements were presented for the southern territory. Based on these ratios alone, we are unable to determine whether the rate structure is just and reasonable. We, therefore, find that a further investigation into the rate structure of this commodity in the three territories is necessary as stated in our "General Discussion and Conclusions" set forth hereafter.

SAWDUST AND WOOD SHAVINGS (STCC No. 24 293)

Respondents.—These commodities move on incentive lumber mileage scale of rates in the southern territory, having 60,000- and 90,000-pound minimums. These rates were established in June 1965 in an effort to arrest the diversion of this traffic to motor carriers. No further change was made in these rates until 1975 when the 40,000 pound and excess rates were canceled (because they were only marginally compensatory) and the 60,000-pound rate was increased 5 percent at the Ex Parte No. 281 level.

Some carriers have established point-to-point per car rates on movements to pulp and papermills on their respective lines for movements in woodchip cars. These rates are based on 90 percent of the unit capacity of the woodchip car being used multiplied by the existing per unit woodchip rate for the actual distance involved. However, these rates do not make up the preponderance of the traffic.

The L&N handled 903 cars of shavings or sawdust (32,897 tons) producing gross revenues of \$169,130 in 1975. No unit slips were presented on these movements.

The ICG originated 2,807 cars in the southern territory in 1975 which produced a total revenue of \$1,085,968. It submitted

¹⁰⁸This proceeding is now before the U.S. Court of Appeals in action No. 76-3775.

movements covering 1,350 cars (\$306,386 in revenue) as repetitive movements.

The N&W handled 132 tons of shavings or sawdust in 1975 producing revenues of \$1,752.

Opposing shippers.—The Lane Company Incorporated (Lane) manufactures and sells household furniture. It has plants in Mississippi, Tennessee, North Carolina, and Virginia. It produces as a byproduct of its furniture operations wood waste in the form of shavings, sawdust, and small pieces. The waste has little commercial value and is either discarded or collected for recycling into chipboard which is composed of random size wood fibers, chips and resins. The chipboard is used as a core for wood veneers.

Lane has a chipboard plant at Altavista, Va., where it receives waste from its other facilities. Freight rates, it is argued, are a major factor in determining the volume and distance the material can be transported.

In 1975 the railroads, as indicated by Southern Railway, canceled the 40,000-pound minimum rates and raised the minimum to 60,000 pounds. The dry wood waste does not meet the minimum weight requirement, therefore, the actual cost of transporting the waste is higher than the transportation of lumber. This change in the minimum weight has caused a decrease in the utilization of rail service from one of Lane's facilities and it is indicated that as soon as additional motor vehicle equipment is available, overall utilization of rail will decrease. This indicates the sensitivity of the movement by rail to changes in rail freight rates, argues Lane.

The movement of the wood waste inbound into its Altavista plant usually had an outbound movement of furniture in the same boxcar. This, it is argued, is better equipment utilization than that of lumber which involves considerable empty miles. It is also noted that no increase in equipment maintenance is needed in moving wood waste.

Lane criticizes respondents' submissions which it argues: (1) only consider the movement of wood waste to the paper industry; (2) do not discuss the effect of rates on the movements of the commodity, its loading and unloading characteristics and equipment; and (3) make no suggestions to alternative service or pricing. It is, therefore, urged that the Commission should act to provide low cost facility and service to encourage the movement of recyclables, or in the alternative, economically deregulate recyclable commodities.

Conclusions.—The ratios on sawdust, wood shavings, is 117 in the South. Lane complains that the minimum weights on this commodity 356 I.C.C.

are too high and that this is impeding its movement. However, the adjusted ratio of revenue to variable cost of this commodity is shown to be just slightly above variable cost, which is probably the reason for the minimum weight increase. Respondents are not required to transport a commodity at a loss; and, therefore, a reduction in rates is not required. We, therefore, find that the rate structure is just and reasonable, in the South.

No shipper interest was expressed in the East and West. However, the adjusted cost-ratio of wood shavings in the East is 124 and that in the West is 130. A comparison of these low ratios with the one in the South also supports the conclusion that the rate structure in the East and West on these commodities is just and reasonable.

BEVERAGE CONTAINERS RETURNED EMPTY (STCC No. 42 111 42)

Respondents.—The Southern handled 15,751 tons of returned empty beverage containers in 1975. Over 80 percent moved within southern territory. The beverage containers consisted primarily of intoxicating liquor and malt beverage bottles. These shipments formerly moved on mileage rates applicable only when the empty containers were loaded in a car used on an immediately preceding inbound rail movement of filled containers. To stop diversion of malt liquor traffic to motor carriers, respondents agreed to return the empty containers free if they got the outbound loaded movement. The rule is applicable only from points where the car is released empty to origin point via reverse route of that used on inbound subject to certain additional provisions.

The L&N handled 636 cars (10,118 tons) of empty returned beverage containers which produced gross revenues of \$78,219. No unit slips were prepared for these movements.

The environment would be benefited by the increasing use of returnable bottles according to the FEIS, as shown in the table below. Returnable bottles would also reduce litter. Mandatory deposits for beverage containers, prohibition against the sale of nonreturnable bottles, and taxes on bottles are being used to encourage their reuse. However, as stated in our earlier discussion under "cullet," transportation rates, according to the FEIS, do not influence the utilization of returnable bottles.

356 I.C.C.

TABLE 108

Environmental profile of returnable bottles

	Current system ¹	All re- turnable	Percent re- duction
Raw materials (million pound).....	28,054	12,280	-56
Water discharged (billion gallon).....	215	121	-44
Air emissions (million pound).....	1,616	741	-54
Water pollution.....	337	274	-19
Solid waste (million cubic feet):			
Industrial.....	370	70	-81
Net post consumer.....	122	94	-23
Energy consumption (trillion BTU).....	388	170	-56

¹The current system of beverage containers is a mix of returnable bottles, one-way bottles, bimetal cans, and aluminum cans.

Source: FEIS, Ex Parte No. 319, p. 4-159.

Rebuttal.—The WRA take the position that empty returned beverage bottles when returned to a bottling plant for another fill, are nothing more than used bottles. They are what might be termed returnables or reusables for recirculating. However, since there is no intended remanufacturing, they are not "recyclables." It is contended that the railroads and the Commission have advocated the use of rates on a given commodity, regardless of whether that commodity is new and unused or whether it has been used but is still in initial shape and form of manufacture and suitable for further use. In other words, used bottles are nothing more than bottles. Reuse of a commodity, in the opinion of the respondent, does not qualify that commodity for treatment as a recyclable commodity.

The WRA does not object to the inclusion of these commodities in this investigation, however, they do object to the inclusion of commodities such as steel drums, bags, and beverage containers returned empty, in any formalized listing of recyclable materials or materials for recycling which do not conform to the definition of recycling as set forth in item 500 of the railroads' tariff in Ex Parte No. 305-RE.

Conclusion.—As noted earlier, respondents' definition of recyclable shall be ordered modified to conform to the definition of recyclables as contained in section 204 of the 4R Act. Returnable bottles are clearly included within the definition in section 204 for it states therein that a recyclable commodity is one recovered from waste for commercial usage, "whether or not such collection or recovery follows end usage as a product."

356 I.C.C.

We also note that beverage containers returned empty have adjusted cost-ratios of 69 in the East, 55 in the South and 64 in the West. Southern respondents also indicate that empty containers are returned free to the origin point in certain specified circumstances. This and the other evidence of record supports the conclusion that the rate structure on beverage containers returned empty in the three territories is not above the maximum level of reasonableness.

STEEL CONTAINERS (STCC No. 34 912)

Respondents.—Shipments of new and used steel shipping containers within SFA territory generally move on commodity rates minimum 18,000 pounds. When the present scale rates were established in 1964, an objection was received by a manufacturer of new drums. It was alleged that new drums compete with old drums which were increasing their share of the market and that therefore, the commodity description should be modified to include new drums. This was done in 1965.

During 1975, the Southern handled 13,762 tons of new and used steel shipping containers. Over 70 percent of this traffic moved within SFA territory. The L&N handled 1,291 cars (14,061 tons) of steel containers which produced a gross revenue of \$284,243 in 1975. No unit slips were presented on these movements.

Opposing shippers.—The National Barrel and Drum Association (NBDA) argues that the increasing freight charges for "raw used drums" which are 18-gauge, standard weight drums would have adverse effects on the recycling of this commodity. A "raw used drum" is one that has been emptied of its contents and is being returned to a reconditioner. A standard gauge drum can be reconditioned between 10 and 12 times as compared to a lighter weight drum (20 gauge) which can be reconditioned only an average of 2 or 3 times.

In the past, the title to the drum was retained by the original industrial owner. Recently however, the return freight charges for empty drums have increased so much that some companies sell the drum and its contents.

The NBDA also states that the Southern's justification for including new drums with old drums is no longer valid. Overall it is contended that there has been a 50-percent increase in the manufacture of new drums between 1967 and 1974. However, twice as many drums are reconditioned each year than are produced by new drum markets. It also points out that the "used rate" given by

356 I.C.C.

the Southern is only applicable to an empty used drum, not on a drum that has been reconditioned.

The production of light-gage drums¹⁰⁹ consumes 10 times as much energy as reconditioning an old drum. A study offered on "The Energy Requirements of Steel Drum Manufacturing and Reconditioning,"¹¹⁰ substantiates these savings. It is, therefore, argued, that a decreasing utilization of reconditioned drums will detrimentally affect the environment.

The FEIS states that in refilling, single-use drums require twice as much energy as heavier drums that can be reconditioned. Therefore, it concludes that to the extent freight rate policies encourage use of the reusable drums, environmental benefits would result.

Conclusions.—The ratios on steel drums are 128 in the East, 167 in the South, and 173 in the West. The NBDA request that rates on a raw used drum, 18 gage, should have a lower rate than those of a lighter gage drum. It offers as justification for the differentiation only environmental concerns. However, we are unable to determine whether freight rates have impeded the movement of this commodity. Although they state freight rates are making it uneconomical to use the reconditioned drum, no substantiating evidence was presented. As noted by NBDA, although the production of the lighter gage nonrecyclable drums has increased, twice as many drums are reconditioned each year.

We find the rate structures in the East, South, and West on used steel drums is just and reasonable because (1) there is no evidence that freight rates are impeding the movement of the used drums, (2) these ratios are not excessive, and (3) the used drums are taking the same rate as the new drums.

WOOD SCRAP (STCC 40 23)

Respondents.—The L&N handled three cars (115 tons) of wood scrap producing revenues of \$760 in 1975. No unit slips on these movements were presented. The ICG originated 38 cars of wood scrap which produced \$6,985 in revenue in 1975. No representative movements were given.

Conclusions.—Wood scrap, waste, has an adjusted cost ratio of 84 in the East, 108 in the South, and 221 in the West. The low-cost

¹⁰⁹The production of lightweight drums has increased from 2 percent of total new drums in 1957 to 51 percent in 1975.

¹¹⁰The study prepared by Professors Laurel Lunt Prussing and John E. Prussing (1974), is included in our bibliography.

ratios in the South and East support the conclusion that the rates are not above the maximum level of reasonableness. However, the cost ratio in the West is clearly in excess of those in the other two territories. Since no information was presented as to the amount of traffic moving in the West, we are unable to determine if this high ratio is having an effect on the movement of the commodity. We will, therefore, order a further investigation of this commodity in the West as set forth in the "General Discussion and Conclusions" hereafter.

MUNICIPAL GARBAGE (STCC No. 40 291 14)

Respondents.—The L&N handled 14 carloads of municipal garbage (490 tons) in 1975 which produced revenue of \$4,012. No unit slips were presented for these movements. The N&W and ICG report that they had no originating movements of municipal garbage in 1975.

Opposing shippers.—The American Society of Civil Engineers (Civil Engineers) discussed the development of solid waste management and municipal garbage waste which is composed of cullet, iron or steel scrap, aluminum or alloy scrap, paper waste and rubber or plastic scrap. They point out that: (1) local municipalities or groups of municipalities are responsible for solid waste management; (2) recovery of solid waste is desirable; (3) a number of acceptable different solid waste management systems exist; (4) the market for recovery is limited because of the availability of other sources of energy at lower costs; and (5) solid waste management system costs includes significant transportation costs.

It is contended that the higher the proportion of solid waste utilization the higher the transportation costs because of the necessary concentrating of raw solid wastes prior to processing and transporting greater distances. Any action which tends to decrease the costs to municipalities of implementing the system with a high degree of resource utilization will, therefore, benefit the Nation.

Conclusions.—There were no unit slips presented for movements of municipal garbage. The little evidence presented on this commodity is not sufficient to make a determination on the justness and reasonableness of the existing rate structure. We, therefore, conclude that a further investigation of these commodities as set forth in the "General Discussion and Conclusions" is necessary.

356 I.C.C.

BAGS, OLD BURLAP (STCC 41 114 34)

Respondents.—The Southern moved seven cars of old bags in 1975. The L&N handled one carload of old bags (23 tons) producing revenues of \$463 in 1975.

Conclusions.—Old bags have an adjusted cost ratio of 91 in the East, 205 in the South, and 177 in the West. The low cost-ratio in the East indicates that the rates on this commodity do not exceed the maximum level of reasonableness. However, the ratios in the two other territories are higher. Without more information we are unable to determine if these rate structures are unjust and unreasonable. We will, therefore, order a further investigation of these commodities in the South and West as set forth in the "General Discussion and Conclusions."

BAGS, OLD, HAVING VALUE FOR CONVERSION INTO BALE (STCC No. 41 115 80)

Respondents.—The Southern handled 8 carloads of bags having value for conversion within SFA and 14 carloads between official and southern territories in 1975. The L&N reported that it handled eight cars of this commodity (174 tons) producing revenues of \$1,786 in 1975. No unit slips were presented on these movements.

Conclusions.—The adjust cost-ratio for this commodity is 195 in the South. No originating movements were presented for the eastern and western territories. Since we have no information as to the value of this commodity (and whether it is comparative to bags, old STCC No. 41 114 34 discussed hereafter), no comparison can be made with these ratios. The evidence presented is insufficient to determine whether the rate structure is just and reasonable. We will, therefore, order a further investigation of this commodity in all territories as set forth in the "General Discussion and Conclusions."

GENERAL DISCUSSIONS AND CONCLUSIONS

Commodities with no evidence.—Respondents had the burden of proof in the investigation and in most instances, they have met this burden by establishing that the rate structures on the investigated commodities are just, reasonable, and nondiscriminatory. The number of commodities to be investigated combined with the time restraints in this proceeding were such, however, that the carriers concentrated their efforts on commodities which were more significant from a revenue or tonnage standpoint. Therefore, evidence on the less significant commodities (such as those in table

356 I.C.C.

It is insufficient on which to base determinations of reasonableness and discrimination.

Some opposing parties may argue that since the railroads have not established the reasonableness of the rate structure of these commodities, that percentage reductions in rates should be ordered. We disagree. The problem with ordering such a reduction, based on the evidence of record, is that we are unable to determine if the rate structure is unjust and unreasonable. Such an action without information as to the amount of traffic moving, the effect of rail freight rates on the movement of traffic, the value of the commodity and other data, would decrease the carriers' revenue without full knowledge of the impact of such reduction. A rate reduction based on a revenue to variable cost ratio alone, is as unfounded as a rate reduction based on a mere disparity in rates.

In section 204(a) of the 4R Act, the Commission is ordered to investigate the rate structure on recyclable commodities in this proceeding, "and thereafter as appropriate." We also note that in section 204(a)(4) of the act, Congress states that we are to report to it and the President for each of the 3 years following the enactment of the 4R Act of "all actions commenced or completed under this section to eliminate unreasonable and unjustly discriminatory rates" on recyclable materials. This indicates that further proceedings in this area, where found necessary, are contemplated. On this basis, we will order a separate proceeding to investigate the following commodities which either did not have a revenue to variable cost ratio because of the failure of the railroads to submit movements or did not have sufficient evidence on which to base a decision on whether the rate structure for that commodity is just and reasonable. A forthcoming order will continue to require the railroads to assume the burden of proof and will describe the specific evidence to be submitted by respondent railroads.

TABLE 109

STCC	Commodity	Territory
33 312	Copper matte	South
33 322	Lead matte	South
33 398	Misc. nonferrous metal residues	South
40 23	Wood	West
40 291 14	Municipal garbage	All territories.
41 114 34	Bags, old	South and West.
41 115 80	Bags, old, value for conversion	All territories.
20 511 80	Bakery refuse	All territories.

356 I.C.C.

Certain percentage reductions have been ordered on some commodities because the rate structure was found to be unjust and unreasonable. Reductions in rates have been ordered instead of holddowns in future general rate increase proceedings to provide immediate relief to the shippers of these commodities. The immediate reductions will simplify the carriers' implementation of the granted relief and assure compliance with our order.

The percentage reductions are based on all the evidence of record including the revenue-cost ratio, the value of the commodity, and the financial impact of the reduction on the railroad respondents. Carefully weighing these and other factors, the percentage reduction in rates was computed, which corrects the found unreasonableness in that particular rate structure.

We are dealing herein with rate structures which are composed of hundreds of individual rates. We realize that with respect to specific movements the ordered reduction could produce revenues below variable cost. In such instances, we recognize the right of the carrier to take appropriate action to remedy such situations should they exist.

Incentive rates.—A number of the opposing parties, most notably NARI, have urged the prescription of incentive rates for recyclables. We have mentioned such requests in various sections of this report. Alternating rates and minima have been approved or prescribed by the Commission to meet the needs of particular traffic. See *Eastern Brick Rates*, 218 I.C.C. 59, and cases cited at page 71 (1936), *Iron and Steel to Iowa, Minn., Mich., and Wis.*, 263 I.C.C. 361, 406 (1946). If the interested shippers will provide the necessary data and failing receptive action on the part of the carriers affected this Commission will take appropriate action. Even if there is some indication that shippers will not use the rates we have the power to order the establishment of a proper scale of alternating incentive rates which will encourage the development of whatever technological changes are needed for larger sales units and lading weights, while maintaining rates at lower minimum weights to meet continuing needs for smaller shipments. See decision and order of division 2 in docket No. 35960, *Sunkist Growers, Inc. et al. v. The Akron, Canton & Youngstown Railroad Company et al.*, decided July 29, 1976 and *Lake Carriers' Assn. v. United States*, 399 F. Supp. 386 (1975). The problems can be solved but obviously the lack of specific rate, cost and other data is part of the problem. The time constraints and our consideration of the primary issues in this investigation as well as the lack of a proper

356 I.C.C.

record prevents us, for example, from extending the present 100,000-pound scale of wastepaper rates in the South to other territories as is sought by Bergstrom Paper Company, Neenah, Wis.

The record indicates that appropriate incentive rates are the goal of many shippers attempting to lower their transportation costs and increase the quantities of commodities being recycled. We strongly urge the carriers to seize this opportunity to develop the necessary marketing and other studies which are essential to the publication of scales of proper incentive rates which will share the cost savings with the shippers, improve the net earnings of the affected carriers, and facilitate the movement of recyclable commodities. In *Increased Freight Rates and Charges*, 1972, 346 I.C.C. 88 (1973) we stated at page 223:

Rates to encourage multiple-carload movements now exist for non-ferrous metal scrap. Expanding such rates to include all other scrap materials, and adding rate scales respecting density would encourage movements of all processed scrap and increase its attractiveness as a material source. This alternative should be pursued by the railroads, and we admonish them to do so.

Since that time some shippers have, for example, acquired expensive high-density balers and made other technological improvements while some incentive rate scales have been established, much more can and must be done and we strongly admonish the carriers to expand this effort and inform us of their results. If action is not forthcoming in this area, we shall report this fact to Congress and consider the advisability of instituting a further investigation.

In closing, we would like to emphasize that the ratios of revenue to variable cost resulting from the reductions ordered herein are not to be construed, in and of themselves, as standards of maximum reasonableness. We have ordered reductions not based simply on the ratios, but based on consideration of all evidence of record, in light of the special character of this investigation under the 4R Act and the statutorily imposed burden of proof on the railroads. We have continually rejected the notion that we should declare a particular revenue to cost ratio to be the sole criterion for determining maximum reasonableness. See *National Elec. Mfrs. Assn. v. Aberdeen & R.R. Co.*, 349 I.C.C. 502, and I.S. 8848, *Proportional Rates on Coal to Ohio River Points* (order dated November 2, 1976). The ratios were a useful and appropriate tool in this investigation; however, their value does not extend beyond their use in making the considered determinations and ordering relief herein.

ULTIMATE FINDINGS

In this investigation we find:

1. That the following rate structures are not unjustly discriminatory but are unjust and unreasonable:

- (a) Aluminum residues in the official, southern, and western territories;
- (b) Miscellaneous nonferrous metal residues in the official territory;
- (c) Copper matte, speiss or flue dust in the western territory;
- (d) Zinc dross in southern territory;
- (e) Cullet in the official, southern, and western territories;
- (f) Reclaimed rubber in the official and southern territories; and
- (g) Ashes in official and western territories;

2. That additional investigation into the reasonableness of the rate structures on the following commodities is required:

- (a) Miscellaneous nonferrous metal residues in the southern territory;
- (b) Copper matte in the southern territory;
- (c) Lead matte in the southern territory;
- (d) Wood scrap in the western territory;
- (e) Municipal garbage in the official, southern, and western territories;
- (f) Bags, old, in the southern and western territories;
- (g) Bags, old, having value for conversion in the official, southern and western territories; and
- (h) Bakery waste in the southern, official, and western territories;

3. That the respondents' tariff definition of a recyclable material shall be modified to conform to the definition set forth in section 204(e)(1) of the 4R Act; and

4. That this decision does not significantly affect the quality of the human environment within the meaning of the National Environmental Policy Act of 1969.

The National Association of Recycling Industries, Inc. on December 30, 1976, filed a motion to recuse and requested disqualification of Chairman Stafford and Commissioners Hardin and Christian. The Commission has determined that this motion should be acted upon by the named Commissioners.

An appropriate order will be entered.

CHAIRMAN STAFFORD concurring:

I have given full and careful consideration to the Motion to Recuse filed by the National Association of Recycling Industries, Inc. insofar as that motion pertains to my participation in this matter. I find that the motion and the supporting affidavit are insufficient in law and in fact to warrant anything less than my full participation in the disposition of this proceeding and, therefore, I decline to recuse myself.

COMMISSIONER HARDIN is not participating in this proceeding, which is consistent with his position in this matter since the Commission,
356 I.C.C.

by order of April 2, 1976, consolidated Ex Parte No. 270 (Sub-Nos. 5 and 6), in which Coordinator's reports had been served, with Ex Parte No. 319 for decision. Accordingly, his nonparticipation is disposing of the instant motion to recuse should not be misconstrued.

COMMISSIONER CHRISTIAN refused to disqualify herself from participating in this proceeding.

VICE CHAIRMAN CLAPP dissents. (His expression will be served separately.)

COMMISSIONER CHRISTIAN, whom COMMISSIONER O'NEAL joins, dissenting:

I cannot say that I agree or disagree with the ultimate results reached by the report. I can only state that the rate structure study mandated by Congress has not been properly conducted.

I do not believe that the majority has complied with section 204 of the 4R Act by issuing its report. Section 204(a)(2) requires the Commission to conduct an investigation of the rate structures of recyclable materials and competing virgin natural resource materials, in which the rail carriers bear the burden of proving that the rate structures are reasonable and nondiscriminatory. To me, this means that the entire burden of justifying the existing rate structures was placed on the railroads, who were obligated to demonstrate that such structures are reasonable and do not result in discrimination against recyclables. But under the majority's approach, this has not been done. The report dwells more on industry structures than rate structures and has unlawfully shifted the burden of proof to the ratepayers.

The report never comes to grips with the concept of discrimination. What the report should do is acknowledge the different rate treatment accorded virgin materials and their recyclable counterparts and then move on to examine carrier justification for existing rate disparities. Instead, in the case of scrap iron and steel and iron ore (the commodities accorded the most extensive discussion) a section 3(1) analysis is performed. The rate disparity is noted, competition is presumed¹ but no injury is found.

¹The majority's refusal to make a positive finding of competition on this record is baffling to me.

The fourth element of the section 3(1) analysis—whether rate differences are justified by differences in transportation conditions—is never reached. The failure to show injury is permitted to deprive the shippers of their right to nondiscriminatory rate treatment. In practical effect, the report has lifted the statutory burden of proof from the carriers and placed it on the shippers.

The balance of the report, dealing with other commodities, is even less satisfactory regarding competitive findings. Arbitrary percentage reductions are ordered on certain commodities which appear to have no rational basis. The only inquiry appears to be "what the traffic will bear." There is no real analysis of rate structures. Nor is there any thorough analysis of the effect of the general increases upon those rate structures, which is required by section 204.

This agency has been promising, and under section 204 was required, to resolve the longstanding question of whether the underlying rate structures for virgin materials and competing recyclable materials are unreasonable or discriminatory. The Supreme Court in *Aberdeen & Rockfish R. Co. v. S.C.R.A.P.*, 422 U.S. 289, 322-328 (1975), recognized our discretion to select an appropriate proceeding to examine the issue. This was supposed to be that proceeding. I am sorry to state that we have failed to resolve the issue by neglecting to abide by the rules provided by the Congress.

COMMISSIONER HARDIN did not participate.

VICE CHAIRMAN CLAPP, dissenting:

The majority, in approving this report, has failed to meet the Commission's responsibility under section 204 of the 4R Act. In essence Congress instructed the Commission to investigate the rate structures for "recyclable or recycled materials and competing natural resource materials, and the manner in which such rate structure has been affected by successive general rate increases." The Commission has responded in this report by saying that the commodities do not compete. That misses the mark and by a wide margin.

The record clearly demonstrates that rate disparities exist with regard to some of the recyclable commodities and their virgin counterparts. The investigation should have focused on the question of whether or not existing rate disparities are justified by a difference in transportation conditions. Instead, the Commission has applied a traditional section 3(1) analysis, and has found that there is no competition between most of the commodities under investigation, and that shippers of recyclables are entitled to no relief.

The concept of competition applied here is unrealistically narrow. For example, I cannot accept the conclusion that the demand for scrap iron and steel is totally unresponsive to price. Certainly a broad disparity in freight rates will affect the efficiency of nonintegrated vis-a-vis integrated steel producers, and the relative prosperity of the nonintegrated producers will affect the amount of scrap consumed.

In my view, the section 3(1) analysis should not be allowed to obscure the purpose of this investigation mandated under section 204 of the 4R Act. The term "discrimination," as used here means unequal treatment and that unequal treatment has been shown. The Commission should now face the hard task of determining whether that inequality is justified by differing transportation conditions.

APPENDIX A

*Railroad Revitalization and Regulatory Reform Act of 1976,
Public Law No. 94210, 45 U.S.C.*

INVESTIGATION OF DISCRIMINATORY FREIGHT RATES FOR THE TRANSPORTATION OF RECYCLABLE OR RECYCLED MATERIALS

Sec. 204. (a) INVESTIGATION.—The Commission, within 12 months after the date of enactment of this act, and thereafter as appropriate, shall—

(1) conduct an investigation of (A) the rate structure for the transportation, by common carriers by railroad subject to part I of the Interstate Commerce Act, of recyclable or recycled materials and competing virgin natural resource materials, and (B) the manner in which such rate structure has been affected by successive general rate increases approved by the Commission for such common carriers by railroad;

(2) determine, after a public hearing during which the burden of proof shall be upon such common carriers by railroad to show that such rate structure, as affected by rate increases applicable to the transportation of such competing materials, is just, reasonable, and nondiscriminatory, whether such rate structure is, in whole or in part, unjustly discriminatory or unreasonable;

(3) issue, in all cases in which such transportation rate structure is determined to be, in whole or in part, unjustly discriminatory or unreasonable, orders requiring the removal from such rate structure of such unreasonableness or unjust discrimination; and

(4) report to the President and the Congress, in the annual report of the Commission for each of the 3 years following the date of enactment of this act, and in such other reports as may be appropriate, all actions commenced or completed under

356 I.C.C.

this section to eliminate unreasonable and unjustly discriminatory rates for the transportation of recyclable or recycled materials.

(b) PARTICIPATION.—The Administrator of the Environmental Protection Agency shall take such steps as are necessary to assure that the Commission carries out the requirements set forth in subsection (a) of this section as expeditiously as possible. Such Administrator is authorized to participate as a party in the investigation to be commenced by the Commission under such subsection (a).

(c) RESEARCH, DEVELOPMENT, and DEMONSTRATION.—The Secretary, in cooperation with the Commission, shall establish a research, development, and demonstration program to develop and improve transport terminal operations, transport service characteristics, transport equipment, and collection and processing methods for the purpose of facilitating the competitive and efficient transportation of recyclable or recycled materials by common carriers by railroad subject to part I of the Interstate Commerce Act.

(d) REVIEW.—Orders issued by the Commission pursuant to this section shall be subject to judicial review or enforcement in the same manner as other orders issued by the Commission under the Interstate Commerce Act. In all proceedings under this section, the Commission shall comply fully with the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*)

(e) DEFINITIONS.—As used in this section, the term—

(1) "recyclable material" means any material which has been collected or recovered from waste for a commercial or industrial use, whether or not such collection or recovery follows and usage as a product; and

(2) "virgin natural resource material" and "virgin material" mean any raw material, including previously unused metal or metal ore, woodpulp or pulpwood, textile fiber or material, or other resource which is, or which will become (through the application of technology), a source of raw material for commercial or industrial use.

APPENDIX B

*Order Instituting Investigation
(includes original bibliography)*

At a Session of the INTERSTATE COMMERCE COMMISSION, Division 2, held at its office in Washington, D.C., on the 20th February 1976.

EX PARTE NO. 319

INVESTIGATION OF FREIGHT RATES FOR THE TRANSPORTATION OF RECYCLABLE OR RECYCLED MATERIALS

Through the years the Interstate Commerce Commission has had a strong and continuing interest in the discovery and subsequent elimination of all forms of freight rate discrimination. Prior to and after the enactment of the Environmental Policy Act of 1969, the Commission, upon its own motion, upon the motion of others, and in response to various legislative enactments, has devoted significant time and effort to issues concerning the rate structures on recyclable materials. The Commission's recognition of the need to draw recyclable materials into the main stream of the economy is manifested in such proceedings as Ex Parte No. 270 (Sub-Nos. 5 and 6),

356 I.C.C.

Investigation of Railroad Freight Rate Structure, Iron Ores & Scrap Iron and Steel, Ex Parte No. 295 (Sub-No. 1), Increased Freight Rates and Charges, 1973—Recyclable Materials, Ex Parte No. 305-RE, Increased Freight Rates and Charges, 1975—Recyclable Materials, and other general revenue proceedings. In furtherance of a just, reasonable and nondiscriminatory freight rate structure for recyclable materials, the Commission, in Ex Parte No. 306, *Public Law 93-236—Freight Rates for Recyclables*, 346 I.C.C. 408, expeditiously responded to legislative direction by proposing and subsequently adopting appropriate rules to facilitate the elimination of discrimination against recyclable materials.

On February 5, 1975, Public Law 94-210, the Railroad Revitalization and Regulatory Act of 1976 was enacted (90 Stat. 31). The intention of this Act is to provide "means to rehabilitate and maintain the physical facilities, improve the operations and structure, and restore the financial stability of the railway system of the United States, and to promote the revitalization of such railway system, so that this mode of transportation will remain viable in the private sector of the economy and will be able to provide energy-efficient, ecologically comparable transportation services with greater efficiency effectiveness, and economy ***." Embodied in the act are many changes in and additions to the Commission's responsibilities under part I of the Interstate Commerce Act, the Regional Rail Reorganization Act of 1973, and other related statutes.

Section 204 of the act provides, in part, that the Commission shall:

(1) conduct an investigation of (A) the rate structure for the transportation, by common carriers by railroad subject to part I of the Interstate Commerce Act, of recyclable or recycled materials and competing virgin natural resource materials, and (B) the manner in which such rate structure has been affected by successive general rate increases approved by the Commission for such common carriers by railroad;

(2) determine, after a public hearing during which the burden of proof shall be upon such common carriers by railroad to show that such rate structure, as affected by rate increases applicable to the transportation of such competing materials, is just, reasonable, and nondiscriminatory, whether such rate structure is, in whole or in part, unjustly discriminatory or unreasonable;

(3) issue, in all cases in which such transportation rate structure is determined to be, in whole or in part, unjustly discriminatory or unreasonable, orders requiring the removal from such rate structure of such unreasonableness or unjust discrimination;

Although section 204 of the act does not entail specific changes in existing law, it does, inter alia, charge the Commission with the responsibility for conducting an investigation into the rail rate structures for the transportation of recyclable materials and for ordering removal from such rate structure any rates found to discriminate against recyclable materials. The Commission is also ordered to investigate the manner in which rail rate structure have been affected by successive general rate increases.

To assist the Commission in complying with these directives and to assure proper assessment of the issues embodied therein, respondents and other parties should submit their evidence in accordance with the format set forth in appendix A.

In addition to the above, respondents and other parties submitting evidence for consideration in this investigation are cautioned to take particular note of the following: Under section 204(a)(2) of the Railroad Revitalization and Regulatory Reform Act of 1976, the burden of proof is on the common carriers by railroad to

356 I.C.C.

show that the freight rate structure is just, reasonable, and nondiscriminatory. Hence, the carriers will be required to demonstrate the validity of any evidence submitted with respect to the representative or repetitive movements selected. The Commission will determine whether rates on recyclable materials are discriminatory primarily on the basis of comparisons of cost-revenue relationships and the competitive relationships of the involved materials. Although the major issues in this proceeding focus upon the cost and revenue relationships of the material movements under investigation, the Commission intends to fully consider evidence concerning the effects that freight rate structures have on the industries involved and on the environment.

A bibliography of studies concerned with the relationships between recyclable and virgin materials is attached hereto as appendix B. Parties are strongly encouraged to submit additions to and comments on the bibliography as part of their statement of intent to participate due on or before March 9, 1976. Submission of copies of proposed additions to the bibliography should be made to the extent practicable.

It is ordered. That a proceeding be, and it is hereby, instituted with the objective of investigating the rate structure for the transportation, by common carriers by railroad subject to part I of the Interstate Commerce Act, of recyclable or recycled materials and competing virgin natural resource materials, and the manner in which such rate structure has been affected by successive general rate increases approved by the Commission for such common carriers by railroad in order to determine whether such rate structure is just, reasonable, and nondiscriminatory in whole or in part.

It is further ordered. That all common carriers by railroad subject to part I of the Interstate Commerce Act, be, and they are hereby, made respondents in this proceeding.

It is further ordered. That the following recyclable or recycled materials will be the subject of our investigation in this proceeding and that suggestions for additions to or deletions from this list as well as suggestions for a list of competitive virgin natural resource materials should be made in statements of intent to participate due on or before March 9, 1976:

STCC No.	Commodity
22 941-----	Textile waste garnetted or processed
22 973 15 ---	Noils, ramie.
22 973 25 ---	Noils, (combings or comber waste), cotton.
thru	
22 973 68 ---	Rovings, jute and istle (ixtle).
32 299 24 ---	Cullet (broken glass).
33 119-----	Blast furnace or coke oven products, Nec.
332 312-----	Copper matte, speiss or flue dust.
33 322-----	Lead matte, speiss or flue dust.
333 332-----	Zinc dross, residues, ashes.
33 342-----	Aluminum residues.
33 398-----	Miscellaneous nonferrous metal residues.
40 1-----	Ashes.
40 2-----	Waste or scrap.

The STCC numbers referred to shall also embrace all articles assigned additional digits listed thereunder in STCC Tariff I-D.

356 I.C.C.

It is further ordered. That any person interested in this proceeding shall notify this Commission, by filing with the Interstate Commerce Commission, Office of Proceeding, Room 5354, Washington, D.C. 20423, on or before March 9, 1976, the original Commission desires wherever possible (a) to conserve time, (b) to avoid unnecessary expense to the public, and (c) to have service of pleadings by parties in proceedings of this type only upon those who intend to take an active part in the proceeding, the statement of intent to participate shall include a detailed specification of the intent of such person's interest, including (1) whether such interest extends merely to receiving Commission releases in this proceeding; (2) whether he genuinely wishes to participate by receiving or filing initial and/or reply statements, and by attending and/or participating in the public hearing; (3) if he so desires to participate as described in (2), whether he will consolidate or is capable of consolidating his interests with those of other interested parties by filing joint statements in order to limit the number of copies of pleadings that need be served, such consolidation of interest being strongly urged by the Commission; and (4) any other pertinent information which will aid in limiting the service list to be used in this proceeding; that this Commission shall then prepare and make available to all such persons a list containing the names and addresses of all parties desiring to participate in this proceeding and upon whom copies of all statement must be filed.

It is further ordered. That in view of the fact that section 204(a) of the Railroad Revitalization and Regulatory Reform Act of 1976 requires completion on this proceeding within 12 months of the date of enactment (February 5, 1976), an expedited procedure will be followed in this proceeding and extensions of any due dates established herein is not contemplated. Statements of intent to participate including comments on the contents of this order must be filed on or before March 9, 1976. Following the preparation of the service list a procedural order will be entered designating with certainty when the respondents and other parties must submit their evidence and arguments.

And it is further ordered. That a copy of this notice and order be served on each respondent, on each party to the proceeding in Ex Parte No. 305-RE, *Increased Freight Rates and Charges, 1975—Recyclable Materials*, on the Administrator of the Environmental Protection Agency and on the Secretary of Transportation, that a copy be deposited in the office of the Secretary, Interstate Commerce Commission, Washington, D.C. for public inspection, and that statutory notice of the institution of this proceeding be given to the general public by delivering a copy thereof to the Director, Office of the Federal Register, for publication therein.

By the Commission, Division 2.

ROBERT L. OSWALD,
Secretary.

APPENDIX A

Manner in which evidence should be submitted

All submissions (opening statement, reply statement and briefs) should be divided into seven parts. All evidence related to the National Environmental Policy Act of 1969 should be included in those seven parts.

356 I.C.C.

PART I

Historical evidence of costs and movements of recyclable and virgin materials

A. Movements of recyclable and virgin materials

Carriers should submit evidence on representative or repetitive rates as of September 1, 1975. This evidence may be based on sample studies with the burden on the carriers to demonstrate the relevance and validity of the procedures employed or it may be based on rates under which large volumes of the involved commodities moved in 1975.

To facilitate data processing and analysis of the movements, respondents should submit data in the following format. Respondents should take note of the requirements for an estimate of annual net tonnage in item 17.

1. Commodity and STCC No.
1. Origin and destination (city/State).
3. Origin rate territories.
4. Type of rate (single-car, multiple-car, or trainload).
5. Rate in cents per net ton (Ex Parte No. 313 level as of September 1, 1975).
6. If multiple-car or trainload shipment, indicate rate reduction from single-car rate (in cents per net ton).
7. Complete tariff authority.
8. Minimum weight per shipment (net ton).
9. Average weight per shipment (net tons).
10. Average number of cars per shipment.
11. Average weight per car.
12. Car ownership (carrier-owned or leased, or shipper-owned, or leased).
13. Car type (as identified in A.R.R.-I Sch. 417).
14. Route of movement (single-line or interline).
15. Carrier(s) and miles for single-line and/or interline movements:

	Carrier	Short tariff route miles	Route of movement miles	Point of inter- change and/or destination
First	_____	_____	_____	_____
Second	_____	_____	_____	_____
Third	_____	_____	_____	_____

16. Average revenue per car (line-haul revenues ÷ number of cars in the shipment).
17. Estimate of annual tonnage under rate (net tons 1970-1975).

B. Cost evidence

Respondents should submit evidence on costs associated with the representative or repetitive movements of recyclable and virgin materials called for in (A). This evidence should include respondents' analysis of whether the current rates adequately reflect differences in costs due to:

1. distances traveled,
 2. weight of shipments,
 3. special equipment,
- 356 I.C.C.

4. special handling
5. equipment utilization including empty backhauls,
6. equipment maintenance, and
7. other factors.

Supplemental cost evidence should include the unit costs employed along with the method of their computation.

PART II

Historical evidence on utilization of recyclable materials.

Evidence should be submitted which shows the trend in utilization of the virgin and recyclable materials by territory since 1966—including prices and quantities of both recyclable and virgin materials and the effects of previous general rate increases on movements within and between territories. If carriers elect to submit extensive price and quantity data, that information should be presented in table form and comments should be included in the text of the submissions. (Imports and exports should be shown separately). This data should be accompanied by a discussion of the factors which affected utilization and prices for the recycled materials—i.e., market structure for the production and distribution of final products, storage facilities, et cetera.

PART III

Sensitivity of recyclable materials to changes in transportation rates

Respondents should present arguments and evidence to support their position on the extent to which recyclable materials would be substituted for virgin materials if rates on the recyclable materials were lowered, or held down, while rates on virgin materials were allowed to increase with time. In connection with this analysis the following factors should be considered: Factors that affect utilization of recyclable materials and their potential substitution for virgin materials. For example, Are there technological factors that encourage or prevent substitution? Does the market structure (e.g., vertical integration), in any way affect utilization of either virgin or recyclable materials? Are there any government policies or programs which place recyclable or virgin materials at a competitive disadvantage?

Reference to the studies listed in appendix B, or to other studies not listed therein (including analyses of demand and supply elasticity), is encouraged. A discussion of the assumptions and shortcomings of previous studies may also be included.

PART IV

Effects on individual railroads

Respondents should present evidence to support their arguments on the likely effects that rate changes would have on individual railroads' revenues and profitability. This part of the study will depend in part upon the conclusions reached in part III and should include available data concerning evidence of trends indicating intermodal and intramodal shifts, if any, in the transportation of virgin and recycled or recyclable materials, including evidence attributing such shifts to changes in the rate structure for these materials.

Evidence of the significance of recyclable and virgin materials traffic relative to total rail operations should be submitted (revenues and volume in net tons).

356 I.C.C.

PART V

Service to shippers of recyclable materials

Respondents should include a thorough discussion of the effects that rate changes have had and will have on service. Of particular concern is the issue of whether revenues will be adequate to induce railroads to undertake future investments to meet shippers' requirements. Shippers and carriers are encouraged to submit projections of service requirements and evidence of the carriers' ability to meet the shippers' past and future requirements for service.

PART VI

Alternative rate structure

Are there alternative carrier-operating practices or rate structures or tariff arrangements which would be more innovative or more flexible? Parties are encouraged to discuss new ideas and policies relative to ratemaking.

PART VII

Other evidence

All parties should endeavor to submit their evidence, including revenue/cost relationships, under one or more of parts I through VI above. Miscellaneous evidence submitted under part VII should indicate the specific purpose for which it is being introduced and the reason it does not fit within one or more of parts I through VI.

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APPENDIX D

Commodities investigated

TABLE I

STCC No.	Recyclable or recycled material	STCC No.	Virgin natural resource material
22 941 -----	Textile waste garnetted or processed.	24 114 10	Pulpwood or pulpwood logs
356 I.C.C.		26 111 ----	Pulp

Commodities investigated—Continued

TABLE I—Continued

STCC No.	Recyclable or recycled material	STCC No.	Virgin natural resource material
22 973 15---	Noils, ramie	22 999 26	Cotton linters, bleached or dyed.
22 973 25---	Noils (combing or comber waste), cotton	22 971 -----	Wool or mohair, carbonized or scoured.
thru -----		22 992 ----	Jute goods, exc. bags
22 973 68---	Rovings, jute and istle (ixtle)	22 995 ----	Vegetable fibers, exc. cotton.
		28 213 ----	Synthetic fibers, exc. glass
22 994 -----	Packing or wiping cloths or rags (processed textile waste).	22 119 74	Cotton piece goods
		26 111 ----	Pulp
32 299 24---	Cullet (broken glass)	14 413 10	Glass sand, unground
33 119 -----	Blast furnace, open hearth, rolling mill, or coke oven product, nec.	10 1 -----	Iron ores
33 312 -----	Copper matte, speiss or flue dust, aao, dross, slag, skimmings, etc.	10 2 -----	Copper ores
33 322 -----	Lead matte, speiss or flue dust, aao, dross, slag, skimmings, etc.	10 3 -----	Lead or zinc ores
33 332 -----	Zinc dross, residues, ashes, etc.	10 3 -----	Lead or zinc ores
33 342 -----	Aluminum residues, etc.	10 511 ----	Crude bauxite ores
33 398 -----	Misc. Nonferrous metal residues	10 513 ----	Calcinated or activated bauxite ores.
and			
40 1 -----	Ashes	10 1 -----	Iron ores
40 211 -----	Iron or steel scrap	10 3 -----	Copper ores
40 212 -----	Brass, bronze, copper or alloy scrap, aao, tailings or wastes.	10 3 -----	Lead or zinc ores
40 213 -----	Lead, zinc or alloy scrap, aao, tailings or wastes.		
40 214 -----	Aluminum or alloy scrap, aao, tailings or wastes.	10 511 ----	Crude bauxite ores

356 I.C.C.

Commodities investigated—Continued

TABLE I—Continued

STCC No.	Recyclable or recycled material	STCC No.	Virgin natural resource material
		10 513 ----	Calcinated or activated bauxite ores.
40 219 60---	Tin scrap, value for resmelting purposes, consisting of scrap or pieces of metallic, clippings, drippings, shavings, turnings or worn-out block in pipe.	10 929 85---	Tin ore (tin stone or cassiterite), crude.
40 24-----	Paper waste or scrap	24 114 10	Pulpwood or pulpwood logs
40 26-----	Rubber or plastic scrap or waste.	08 423 -----	Latex gums (crude natural rubber), aao, allied gums.
30 3 -----	Reclaimed rubber	28 212 ----	Synthetic rubbers (vulcanizable elastomers), exc. fabricated rubber products.
40 22-----	Textile waste, scrap or sweepings.	26 111 40	Cotton linters
			Pulp
		26 111 ----	Pulp

*Woodchips were not mentioned in any of our orders, however, they have been contended to be a potentially competitive virgin natural resource material and, therefore, have been included in this investigation.

TABLE II

STCC No.	Recyclable or recycled material
20 511 18-----	Bakery refuse or sweepings, feed
24 293 -----	Shavings or sawdust
34 912 -----	Steel shipping containers, viz. steel drums
40 23-----	Wood scrap or waste
40 291 14-----	Municipal garbage waste, solid digested, ground, other than fertilizer, exc. sewage waste.
41 114 34-----	Bags, old, burlap, gunny, jute or sisal, nec., inc. istle (ixtle)
41 115 80-----	Bags, old having no value for further use or reconditioning as bags, but having value for conversion into bale covering.
42 111 42-----	Beverage containers returned empty.

The STCC numbers referred to in both tables also embrace all articles assigned additional digits listed thereunder in STCC Tariff I-D.

356 I.C.C.

APPENDIX E

Examples of Forms For Repetitive Movements

FORM 1

1—COMMODITY DESCRIPTION: Lead Scrap, Inc. STCC No. 40 213 90
 2—ORIGIN: Plant City, Florida
 DESTINATION: Baton Rouge, La.
 3—ORIGIN RATE TERRITORY: SFA
 4—TYPE OF RATE: (X) SINGLE CAR () MULTIPLE CAR ()
 TRAINLOAD
 5—RATE IN CENTS (X-313 LEVEL): PER NT: 2,260 PER CWT: 113
 6—RATE REDUCTION UNDER SINGLE CAR RATE: NA
 (MT)———(CWT)
 7—TARIFF AUTHORITY: C
 8—MINIMUM WEIGHT PER SHIPMENT: 60
 9—AVERAGE WEIGHT PER SHIPMENT: 64.2
 10—AVERAGE NUMBER OF CARS PER SHIPMENT: 1
 11—AVERAGE WEIGHT PER CAR: 64.2 (NT)
 12—CAR OWNERSHIP: (X) CARRIER OWNED OR LEASED
 () SHIPPER OWNED OR LEASED
 13—CAR TYPE (A.R.-R-1-SCH. 417): G
 14—ROUTE OF MOVEMENT: () SINGLE LINE (X) INTERLINE
 15—MILES VIA ROUTE OF MOVEMENT:

Carrier	*Short Tarrif route miles	Route of Movement miles	Point of interchange and/or destination
1st SCT	289	287	Chattahoochee, Fla.
2nd LN	400	403	New Orleans, La.
3rd L&A	79	79	Baton Rouge, La.
4th			
Total	768	769	*Docket 28300 miles

16—AVERAGE REVENUE PER CAR: \$1,450.92
 17—ANNUAL TONNAGE UNDER RATE: 7,704
 18—MOVEMENT COVERED BY THIS SHEET: TOTAL CARS 120
 TOTAL REVENUE \$153,273

FORM 2

FORM WRR-2
 RAILROAD: Burlington Northern, Inc.
 PREPARED BY: L. L. Van Zinderen
 TITLE: Asst. V. Pres. - Costs & Stat.
 TELEPHONE: (612)298-2859

X-319 STCC 22 995 34
 356 I.C.C.

B. COST EVIDENCE

1 & 2—INFORMATION PREVIOUSLY COVERED

3. SPECIAL EQUIPMENT: (Rotary dump, extra large cubic capacity, specially equipped box, et cetera)

Traffic generally is transported in general service boxcars—car type BGu.

4. SPECIAL HANDLING: (Unusual transit, switching, security, etc.)

The shipments do not require special handling such as transit, switching or security.

5. EQUIPMENT UTILIZATION INCLUDING BACK HAULS: (Assigned equipment?)

The box-cars are generally unassigned.

6. EQUIPMENT MAINTENANCE: (Unusual maintenance problems) The boxcars in this service do not necessarily have unusual maintenance problems.

7. OTHER FACTORS:

None

ORDER

At a General Session of the INTERSTATE COMMERCE COMMISSION, held at its office in Washington, D.C., on the 1st day of February 1977.

EX PARTE NO. 319¹

INVESTIGATION FREIGHT RATES FOR THE TRANSPORTATION OF RECYCLABLE OR RECYCLED MATERIALS

Pursuant to section 204 of the Railroad Revitalization and Regulatory Reform Act (4R Act) of 1976, the Commission having this day made a report on its investigation of the rate structure of recyclable or recycled materials and competing virgin natural resource materials and the manner in which such rate structure has been affected by successive general rate increases approved by the Commission, said report containing its findings of fact and conclusion thereon, which report is hereby referred to and made a part hereof.

It is ordered, That the rates on the following commodities originating in the named territories be decreased by the specified percentage reduction:

- (1) Reclaimed rubber (STCC No. 303) reduced by 5 percent in the official territory and 20 percent in the southern territory;
- (2) Copper matte (STCC No. 33 312) reduced by 10 percent in the western territory;
- (3) Zinc dross (STCC No. 33 332) reduced by 20 percent in the southern territory;
- (4) Aluminum residues (STCC No. 33 342) reduced by 15 percent in the official territory, and 5 percent in the southern territory, and 20 percent in the western territory;
- (5) Miscellaneous nonferrous metal residues (STCC No. 33 398) reduced by 20 percent in the official territory;

¹Includes Ex Parte No. 270 (Sub-No. 5), *Investigation of Railroad Freight Rate Structure—Iron Ores*, and Ex Parte No. 270 (Sub-No. 6), *Investigation of Railroad Freight Rate Structure—Scrap Iron and Steel*.

356 I.C.C.

(6) Cullet (STCC No. 32 299 24) reduced by 5 percent in the official and western territories and 15 percent in the southern territory; and

(7) Ashes (STCC No. 40 1) reduced by 20 percent in the official territory and 10 percent in the western territory.

It is further ordered, That the specified reductions shall be computed from the level or rates in effect on the service date of this order.

It is further ordered, That respondents be, and they are hereby, required to make the necessary changes, as hereinabove ordered, on or before 60 days from the date of service of this order on 30 days statutory notice, and rule relief which may be necessary to facilitate the implementation of this order will be considered upon the filing of an appropriate application.

It is further ordered, That a further investigation into the reasonableness of the rate structures of the following commodities in the named territories is required; that a subsequent order will set forth the additional evidence to be submitted by respondent railroads; and that the record in this proceeding as pertinent to the specified commodities will be incorporated therein;

STCC No.	Commodity	Territory
20 511 18-----	Bakery waste-----	Official, southern, and western
33 312-----	Copper matte-----	Southern
33 332-----	Lead matte-----	Southern
33 398-----	Miscellaneous nonferrous metal residues-----	Southern
40 291 14-----	Municipal garbage-----	Official, southern, and western
40 23-----	Wood scrap or waste-----	Western
41 114 34-----	Bags, old-----	Southern and western
41 115 80-----	Bags, old, value for conversion-----	Official, southern, and western

It is further ordered, That railroad respondents shall revise their tariff definition of a recyclable material so that henceforth it will conform to the following definition of a recyclable material set forth in section 204(e)(1) of the 4R Act:

recyclable material means any material which has been collected or recovered from waste for a commercial or industrial use, whether or not such collection or recovery follows end usage as a product.

And it further ordered, That this proceeding be, and it is hereby discontinued, except as to those commodities for which further investigation has been ordered.

By the Commission.

ROBERT L. OSWALD,
Secretary.

(SEAL)

356 I.C.C.

APPENDIX E

APPENDIX E

(Title Omitted in Printing)

**Petitions For Review of Orders of the
Interstate Commerce Commission**

Filed August 2, 1978

Before: WRIGHT, Chief Judge, and SWYGERT* and LEVENTHAL, Circuit Judges

JUDGMENT

These causes came on to be heard on petitions for review of orders of the Interstate Commerce Commission and were argued by counsel. On consideration of the foregoing, it is

ORDERED AND ADJUDGED by this Court that the orders of the Interstate Commerce Commission under review herein in case Nos. 77-1187 and 77-1292 are vacated and the cases are remanded for further proceedings consistent with the opinion of this Court filed herein this date. The petition for review in case No. 77-1193 is dismissed.

Per Curiam

For the Court:

/s/ GEORGE A. FISHER
George A. Fisher
Clerk

Dated: August 2, 1978

Opinion for the Court filed by Chief Judge Wright.

* Sitting by designation pursuant to Title 28, U.S.C. § 291(a).

APPENDIX F

APPENDIX F

Section 204 of the Railroad Revitalization and Regulatory Reform Act of 1976, provides:

Sec. 204. (a) INVESTIGATION.—The Commission, within 12 months after the date of enactment of this Act, and thereafter as appropriate, shall—

(1) conduct an investigation of (A) the rate structure for the transportation, by common carriers by railroad subject to part I of the Interstate Commerce Act, of recyclable or recycled materials and competing virgin natural resource materials, and (B) the manner in which such rate structure has been affected by successive general rate increases approved by the Commission for such common carriers by railroad;

(2) determine, after a public hearing during which the burden of proof shall be upon such common carriers by railroad to show that such rate structure, as effected by rate increases applicable to the transportation of such competing materials, is just, reasonable, and nondiscriminatory, whether such rate structure is, in whole or in part, unjustly discriminatory or unreasonable;

(3) issue, in all cases in which such transportation, rate structure is determined to be, in whole or in part, unjustly discriminatory or unreasonable, orders requiring the removal from such rate structure of such unreasonableness or unjust discrimination; and

(4) report to the President and the Congress, in the annual report of the Commission for each of

the 3 years following the date of enactment of this Act, and in such other reports as may be appropriate, all actions commenced or completed under this section to eliminate unreasonable and unjustly discriminatory rates for the transportation of recyclable or recycled materials.

(b) **PARTICIPATION.**—The Administrator of the Environmental Protection Agency shall take such steps as are necessary to assure that the Commission carries out the requirements set forth in subsection (a) of this section as expeditiously as possible. Such Administrator is authorized to participate as a party in the investigation to be commenced by the Commission under such subsection (a).

(c) **RESEARCH, DEVELOPMENT, AND DEMONSTRATION.**—The Secretary, in cooperation with the Commission, shall establish a research, development, and demonstration program to develop and improve transport terminal operations, transport service characteristics, transport equipment, and collection and processing methods for the purpose of facilitating the competitive and efficient transportation of recyclable or recycled materials by common carriers by railroad subject to part I of the Interstate Commerce Act.

(d) **REVIEW.**—Orders issued by the Commission pursuant to this section shall be subject to judicial review or enforcement in the same manner as other orders issued by the Commission under the Interstate Commerce Act. In all proceedings under this section, the Commission shall comply fully with the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. § 4321 *et seq.*).

(e) **DEFINITIONS.**—As used in this section, the term—

(1) “recyclable material” means any material which has been collected or recovered from waste for a commercial or industrial use, whether or not such collection or recovery follows end usage as a product; and

(2) “virgin natural resource material” and “virgin material” mean any raw material, including previously unused metal or metal ore, wood-pulp or pulpwood, textile fiber or material, or other resource which is, or which will become (through the application of technology), a source of raw material for commercial or industrial use.

APPENDIX G

APPENDIX G**Final Environmental Impact Statement****EXECUTIVE SUMMARY**

The investigation in Ex Parte No. 319 considers the impacts of both (a) the relative rate structure per se between recyclable and virgin raw materials, and (b) the effect of general rate increases on the structure. This environmental impact statement (EIS) assess the effects of changes in freight rates¹ on both the quantity of recyclable material utilized and the concomitant environmental impacts. The EIS does not, and was not intended to, determine the existence of rate discrimination, which is the subject of a separate part of the Ex Parte No. 319 investigation.

The evaluation of the impact of freight rates on recycling implicitly raises the much broader problem of the relative economics of recyclable and virgin material utilization. The impact of freight rates can only be understood in the context of all the economic and technologic factors that influence recycling, which is an extremely complex and dynamic problem. Consequently, this EIS not only evaluates the economic and environmental effects of freight rates, but also attempts to provide a concise description of the overall solid waste problem and current developments in waste management techniques.

The evaluation found that recycling offers major environmental benefits. While natural resource materials are not finite in the sense the world will "run-out" of vital materials, obtaining these materials will become less eco-

¹ If the freight rates for recyclable commodities are found to be discriminatory, the Commission must issue orders removing such discrimination. It is felt that rate adjustments in the range of plus or minus 20 percent would generally be reflective of the resultant changes. This range was thus used to quantify potential environmental impacts.

nomically and environmentally efficient as lower grade ores are mined and more national forests are opened to timbering: impacts that would be mitigated by recycling. However, analysis of each material reveals freight rates do not influence the achievement of the benefits of recycling.

The following specific conclusions were reached:

- Iron and steel scrap—Numerous demand analyses show that the utilization of steel scrap is virtually unresponsive to price, with an approximate transportation demand elasticity of -0.075 . An important constraint on the substitutability between steel scrap and iron ore is the technological limitations on furnace inputs. The impact of freight rates will have a small, and insignificant, impact on the environmental profile of steelmaking and the attainment of steel industry compliance with Federal pollution regulations;
- Aluminum—Recycling of aluminum offers considerable energy savings due to the reduced need for energy intensive bauxite refining. However, demand analyses show that the demand elasticity for scrap aluminum (-0.0254) and the proportion of rail cost to total price (about 5 percent) are very small, so that the effect of freight rates is negligible. The impact of freight rates on the environmental profile of aluminum making is imperceptible;
- Copper—The economic analysis of scrap copper utilization indicates that freight rates will not have a significant impact on the industry environmental profile. Freight rates are only about 2 percent of the total value of scrap copper. Consequently, no environmental impacts are attributed to freight rates;
- Lead—The consumption of lead is somewhat sensitive to price with a price elasticity of -0.322 . However, because transportation costs are only about 6

percent of total scrap price, the economic impact of freight rates is minimal. No environmental impacts were identifiable;

- Zinc—Recovery of obsolete scrap zinc is difficult because zinc is typically used in combination with other metals, and presently only about 5 percent of total zinc is recovered. Consequently, no economic or environmental impact of freight rates were identified;
- Paper—Paper recycling is important because wastepaper represents a large proportion of solid waste generated domestically and forest resources may not be able to meet demand. While the environmental profile of paper production from wastepaper offers considerable savings over production from pulpwood, the small economic impact of freight rates indicate that transportation costs will not play a significant role in paper recovery;
- Cullet—The principle constraint on cullet recovery appears to be the lack of technologically feasible methods of separating glass. Cullet is readily substitutable for virgin materials and is more environmentally efficient. Since cullet demand is limited by the development of separation technology, no environmental impacts were attributed to freight rates;
- Plastics—Recovery of plastics, like cullet, is limited by the need to separate plastics by type which is not currently feasible. Plastic has a high energy conversion value in municipal solid waste, such that conversion appears more efficient than recovery. No environmental impacts were attributed to freight rates;
- Textiles—Textile recovery is hindered largely by the increasing use of synthetic fiber blends which make recovery impossible. No environmental impacts were attributed to freight rates;

- Rubber—No economic or environmental impacts identified; and
- Ashes and blast furnace byproducts—No economic or environmental impacts identified.

For none of the above materials is transportation cost a significant factor in the overall economic and technologic problem of recycling. Close examination of the environmental profile of each industry showed that no significant environmental impacts would result.

Several alternative rate policies and other Federal policy alternatives are discussed. It is apparent that other policy options, such as waste charges and elimination of tax advantages to virgin material industries, will probably have a much greater effect on solid waste flows and recycling than freight rate policies.